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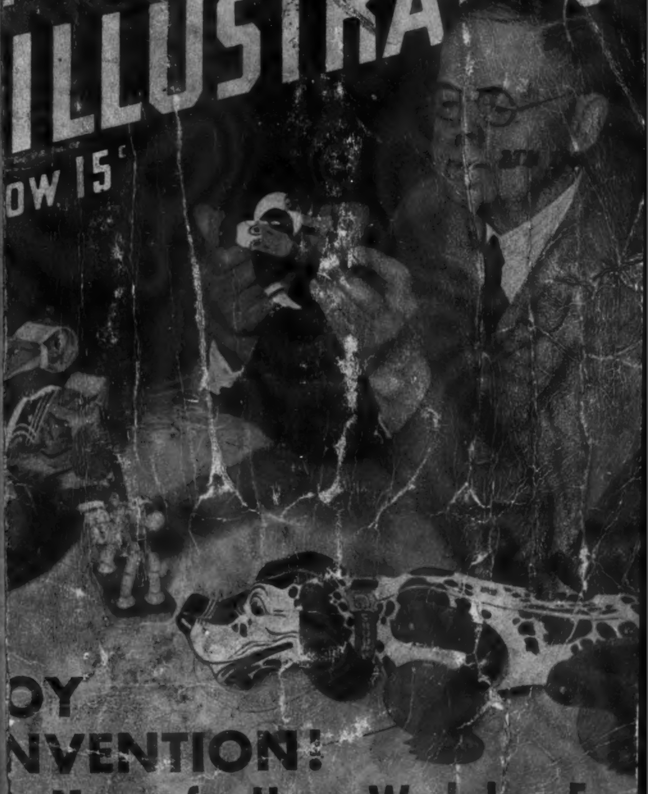

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JANUARY
1939

Volume XXI
Number 3

Circulation over 250,000

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Published monthly by Fawcett Publications, Inc., 11th Street and Broadway, Louisville, Kentucky. Executive Office—22 W. Putnam Avenue, Greenwich, Connecticut. Editorial and Advertising offices—1501 Broadway, New York, New York. Send subscriptions to the Louisville, Kentucky, or Greenwich, Connecticut, addresses.

Entered as second-class matter under the Act of March 3, 1879, at the post office in Louisville, Ky., with additional entry at Greenwich, Conn. Not responsible for unsolicited manuscripts. In U. S. and Possessions and in Canada, 15c a copy; $1.50 a year. Other Postal Unions, $2.00 a year. East Indian Agent, P. C. Eranee Sons, Bombay, India. Printed in U. S. A. Advertising forms close the first of second month preceding date of issue. Advertising offices: New York, 1501 Broadway; Chicago, 360 N. Michigan Ave.; San Francisco, Simpson-Reilly, 1014 Russ Bldg.; Los Angeles, Simpson-Reilly, Garfield Bldg. Member Audit Bureau of Circulation.

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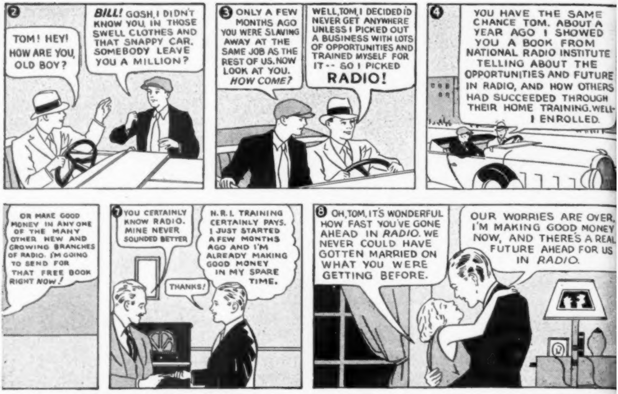
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BILL! GOSH, I DIDN'T KNOW YOU, IN THOSE SWELL CLOTHES AND THAT SNAPPY CAR. SOMEBODY LEAVE YOU A MILLION?
3
ONLY A FEW MONTHS AGO YOU WERE SLAVING AWAY AT THE SAME JOB AS THE REST OF US. NOW LOOK AT YOU. HOW COME?
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4
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7
YOU CERTAINLY KNOW RADIO. MINE NEVER SOUNDED BETTER
THANKS!
N.R.I. TRAINING CERTAINLY PAYS. I JUST STARTED A FEW MONTHS AGO AND I'M ALREADY MAKING GOOD MONEY IN MY SPARE TIME.
8
OH, TOM, IT'S WONDERFUL HOW FAST YOU'VE GONE AHEAD IN RADIO. WE NEVER COULD HAVE GOTTEN MARRIED ON WHAT YOU WERE GETTING BEFORE.
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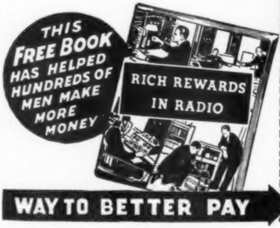
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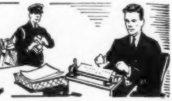
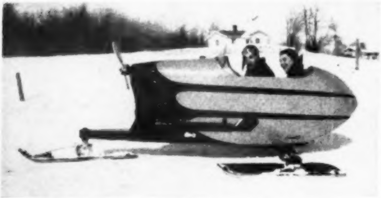
# Chips from the Editor's Workbench



Send in photos of your completed workshop projects. Each month Mechanix Illustrated awards a first prize of $5 for the best photo and letter received by this department and prizes of $3 each for all other photos and letters used.



Snow and ice are welcome when you own a powered sled like this. Built by Albert Leone, it is driven by a propeller geared to a motorcycle engine and zipps along at a 65-m.p.h. speed.

MANY sections of the country are now blanketed with snow and, as a result, powered ice sleds built by MI readers are zipping across country roads providing thrills for spectators and exhilarating action for the drivers. Maybe I should have said "pilots," for some of these powered sleds almost "take off" when they hit a bump at high speed. The trim-looking streamlined job shown above was constructed by Albert Leone, of Duluth, Minn., who says he has made 65 m.p.h. with it and that with ideal ice conditions it should attain a speed of 80-90 m.p.h. (When *DOES* it take off, Al?) The sled is powered by a motorcycle motor, which turns a four-foot propeller, and the body frame is made of spruce covered with plywood. Good work, Al, so I'm awarding you this month's first prize of $5.

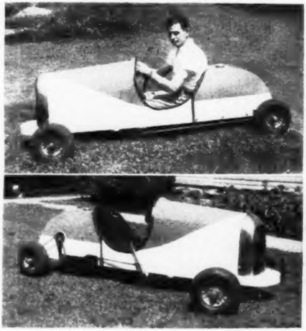
Raymond Le Blanc built this photo printer at a cost of only $1.50.

* * *

At a cost of only one dollar and a half, Raymond Le Blanc, an MI photography fan who lives in Greenwich, Conn., built the photo-printer shown on this page. Ray used plans that appeared in the MI book—"Good Photography" and says that the printer turns out work that rivals a professional job in results. Well, Ray, there's a nice "professional" check for $3 in the mail for you in recognition of a job well done, so be on the lookout for it.

* * *

Scoring a $3 prize, photos sent in by Robert Browning, of Piqua, Ohio, show the classy midget racer he constructed. It is powered by a washing machine motor of the gasoline type and travels at a speed of 18 m.p.h. As can be seen from one of the photos, a V-belt and idler pulley assembly is used to transmit the motor's power to the rear wheel, the pulley acting as a clutch. Very nice, Bob. Congratulations!



These photos show the midget racer constructed by Robert Browning. It travels 18 m.p.h. Note the V-belt and idler pulley assembly which transmits power from motor to wheel.

You still have time to enter the nation-wide "Men With Wings" Contest which is being sponsored by MI and Paramount Pictures. Complete details of the contest in which 23 excellent prizes,

[*Continued on page* 14]

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# Editor's Workbench Chips

[*Continued from page* 12]

A real admirer of Douglas Corrigan is Bill Banias, who constructed this gas-powered model of the famous flyer's Curtiss Robin plane. It has already made 20 successful flights.

including a free round-trip flight to Hollywood, miniature gasoline engines, model airplanes, etc., will be awarded, appeared in the December issue. Secure a back copy by sending 20c to Mechanix Illustrated, Fawcett Building, Greenwich, Conn., and enter the contest before December 27, if you want to compete for the prizes. (See page 66 of this issue for further details).

* * *

When Douglas Corrigan made his famous "wrong way" flight to Ireland a few months ago he became the idol of hundreds of thousands of air-minded people. As an expression of his admiration for Corrigan, Bill Banias, of Kerman, Calif., constructed a gas-powered model of the Curtiss Robin airplane in which the pilot made his trans-Atlantic flight. The model has a six-foot wingspan and is powered with a miniature gasoline engine of one-fifth horsepower. Well done, Bill, so I'm sending you a $3 check.

* * *

I expect to be swamped with inquiries about the midget motorcycle shown in the photo sent in by A. M. Harley, of Augusta, Ga., for it certainly is a project with plenty of appeal for dyed-in-the-wool "dust eaters" who go for midget racers, powered scooters, etc. Harley constructed the frame from three-quarter-inch iron pipe, welded together at the joints. The front fork and handle bars were cut down from an old motorcycle and the motor is a one-half horsepower air-cooled type that provides a speed of 20 m.p.h. I'm sending you a $3 check with my compliments, Harley.

There is plenty of appeal in the midget motorcycle constructed by A. M. Harley. Powered by a one-half horsepower motor, it has a frame made from iron pipe welded together at the joints.

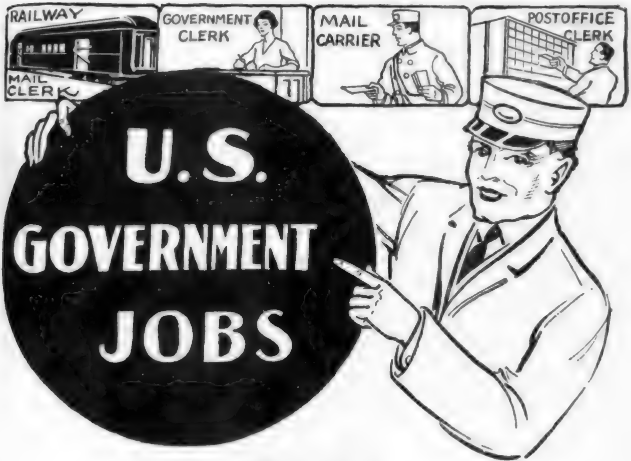
A $3 award was made to Robert J. Winter, of Inglewood, Calif., for the photo he sent in showing his home-built outboard racer. Bob's craft is powered with a 16 horsepower outboard motor and he reports a top speed of 30 m.p.h.. The boat sure looks like a professional job, Bob, and I commend you on your craftsmanship. I have no doubt that the craft is as seaworthy as you claim.

* * *

A really novel project is shown in the photo sent in by Russell Eyerly, of Salem, Oregon, who

[*Continued on page* 16]

Professional-looking in appearance is this outboard racer constructed by Bob Winter. It skims over the waves at 30 m.p.h.



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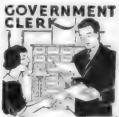

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## Editor's Workbench Chips

[*Continued from page* 14]

**Happy youngsters are these, riding in the electric-powered locomotive constructed by Russell Eyerly. Boasting its own controls, the locomotive can also be operated from a master control station set up alongside the three-rail trackage.**

was awarded a $3 prize. The photo shows a miniature electric-powered locomotive which Russ constructed. He says the locomotive, which operates on a third rail system, can be operated safely by a child in the cab, but that it can also be controlled from a master control station alongside the track. I'll bet the local youngsters go for Russ' railroad in a "big way."

* * *

Farm work will be a whole lot easier for A. H. Barsie, of Eugene, Oregon, in the future, judging from the photo he sent in. The "pix" shows the home-built garden tractor he assembled, using parts from an old truck, a pleasure car and several other salvaged units. Powered by a two-cylinder gasoline engine, Barsie's tractor is hand guided. Watch for a $3 check in the mail, A. H.

* * *

Although this is the January issue of MI, it will reach you before December 25th., so before I forget it, I want to wish every MI reader, and

[*Continued on page* 18]

**Parts salvaged from old autos and trucks were converted into this practical hand-guided garden tractor by A. H. Barsie.**

"IT TOOK ME
TWO DEPRESSIONS
TO 'CATCH ON'!"

"Sure, I was 'sitting pretty' in 1928. Good job, swell girl, no worries. Then—*bang!* — it's '29 and I'm one of the first to be fired! Those were a couple of tough years, I'm telling you. Couldn't find work, and I'd been planning to get married!

"When things picked up, I was back at work — coasting along at the same pay on the same job. I got married. Thought some about the future — but didn't *do* anything about it.

"Then 'recession' came, and I was out again! But I noticed something this time. I noticed that the *trained* men, the boys who knew more than A-B-C about their jobs, weren't 'let out' right off the bat! In fact, the four fellows I knew who had been taking I. C. S. Courses kept their jobs right through the slump!

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# Editor's Workbench Chips

[*Continued from page* 16]

Henry Balmes is shown with the photo enlarger he constructed from plans that appeared in our June, 1938, issue.

especially the Workbench fans, a Merry, Merry Christmas. May Santa be good to you and bring you all the new workshop tools and equipment you have longed for during the year.

* * *

A well earned $3 award goes to Henry G. Balmes, of Milwaukee, Wis., who sent in a photo enlargement made with the photo enlarger (read that twice) he constructed. Henry made a few changes in the plans in order to take advantage of some materials which were ready at hand, but it is readily apparent that he built it from the MI plans that appeared in the June, 1938 issue. The photo editor said I should send Henry a bouquet, but I guess the $3 award will rate higher with a practical fellow. Right, Henry?

* * *

MI readers who are table tennis fans will be interested in the article on building a collapsible six-legged tennis table which will appear in the February issue. Only a few simple tools are required to construct the table, so be sure to read the article. Better reserve your February issue.

* * *

When you are handy with tools you can make

[*Continued on page* 20]

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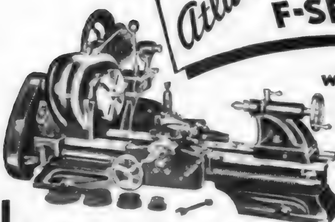

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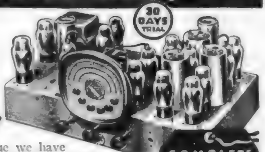

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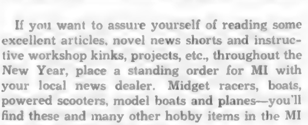
# Editor's Workbench Chips

[Continued from page 18]

many novel decorations for the home. For example, there's John Silbernagel, of Biggar, Saskatchewan, Canada, who is shown posing with the ash tray totem pole and the long-billed bird automatic cigarette humidor he made from plans that appeared in back issues of MI. As a reward to John for his enterprise, I'm sending him a $3 check.

John Silbernagel proudly poses with the totem pole ash tray and the novel humidor he built from plans printed in MI several months ago.

Remember the article on the construction of a model of the famous English seaplane *Caledonia*, which appeared in the January 1938 issue? Well, Gershom Buyon, of Havana, Cuba, followed the plans and carved a well detailed model of the aircraft, which is shown in the accompanying photo. Needless to state, Gershom was awarded a $3 prize, for such outstanding craftsmanship deserves to be recognized.



This perfect replica of the famous English seaplane *Caledonia* is evidence of Gershom Buyon's high grade craftsmanship.

If you want to assure yourself of reading some excellent articles, novel news shorts and instructive workshop kinks, projects, etc., throughout the New Year, place a standing order for MI with your local news dealer. Midget racers, boats, powered scooters, model boats and planes—you'll find these and many other hobby items in the MI line-up for 1939.—*The Editor.*

# $200 My First Week
## ... Now in my OWN Business.

Free Book!
MAIL COUPON now

VON SCHRADER MFG. CO.
201 Pl., Racine, Wis.

Send at once (no obligation) your free booklet illustrating rug-washer and telling how I can own my own permanent business; how I can earn large profits at prices below other methods, how I can become financially independent in a short time, and how I can pay on easy terms.

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We want a reputable, honest man in each county. This man need not have any special experience or more than ordinary ability, but he must be honest and courteous.

Such a man we will start in business for himself. You can make far above average profits in the rug-washing business—a high-grade business all your own. Many earn $[illegible] to $200 per week—some considerably more.

**NO SHOP NECESSARY**

The rug-washer finishes rugs like new on the customer's floor. Anyone can run it. Electricity does the work. A quick, thorough and highly-efficient method that restores the natural beauty of floor coverings.

There are hundreds of customers—in your vicinity and nearby towns. The business grows steadily. Simply wash a few rugs or carpets. These customers tell others and also give you their future work. Soon you will have a prosperous year-around business. Send coupon for booklet explaining everything.

**"Profits Pay for Home"**

[illegible] Hill built and paid for a home from rug-washer profits. His first day's business was $86. Another man writes, "Made $70 in 13 hours." A. L. Miller says, "Have had rug-washer 6 years—have earned as high as $92 a day." M. O. Malmin earned 3 times the cost of his machine the first two months. You, too, can enjoy a large income.

**"Never a Complaint"**

C. J. White says: "$100 business in six days—never a complaint." That is the nicest part of this business—every customer is more than satisfied. Stains and blotches disappear and original colorings and freshness in faded floor coverings come back.

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The complete equipment is inexpensive. A reasonable down payment brings everything to you and the balance is paid monthly. From the start, you have your own business—one that is profitable and of which you can be proud.

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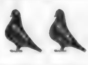

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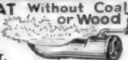

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AMERICAN SCHOOL
Dept. D128, Drexel at 58th Chicago

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New Portable OUTBOARD BOAT
IN A FEW DAYS AT HOME!

Build this light 50 lb. tough, durable, seaworthy portable Outboard Ki-Yak! Take it anywhere by hand or car. Safe, leakproof, trouble-free. More speed per horsepower, more miles per gallon. MEAD'S perfected aluminum-ribbed, cut-to-fit construction Kit guarantees successful assembly quickly, easily, economically. New 59 lb. OK-4 uses oars, sail, motors 10 h.p. or less. Also 2 "CK" paddle-sail models from 20 lbs. to 45 lbs. Rush dime for details. $6 Gift Paddle Offer!

Mead's New OK-2

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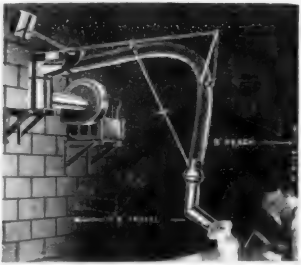
# Apparatus Removes Welding Fumes At Point Of Origin



Eliminating smoke clouds at the point of generation, a newly developed apparatus protects a welder against dangerous fumes and permits better vision of the work at hand. Mounted on an extension tube, the hood gathering the fumes can be extended nine feet outward or raised six feet into the air, thus giving a wide working range to the operator. The fumes are discharged through an exhaust leading outdoors.

# New Fireproofing For Tents Resists Weathering

A weather-resistant fireproofing treatment for cotton fabrics, of importance in fireproofing articles such as awnings and tents which are exposed to rain, has been developed by Martin Leatherman of the U. S. Bureau of Chemistry and Soils.

Numerous attempts to treat cotton fabric in order to render it fireproof even after protracted exposure to weathering have been made in the past, but this is believed the first industrially applicable process that meets necessary standards.

Stannic chloride (a salt of tin), a chlorinated resin and a colored metallic oxide are the principal materials required in the treatment which represents modifications of several previously tried processes. Because of the necessity for a colored oxide pigment to prevent the evolution of hydrogen chloride, the gas which produces hydrochloric acid when dissolved in water, on exposure of the cloth to direct sunlight, the process is not applicable to white fabrics to be used outdoors.

Material treated in accordance with Mr. Leatherman's process was fireproof after six months of exposure.

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$96.00 IN ONE WEEK

I wish you could see the marvelous reports I receive from dealers. Clare C. Wellman, N. J., reported $96.00 clear profits in one week; Wilbur Whitcomb, Ohio, $146; Lambert Wilson, Mich., $79.00; Gunson R. Wood, N. Y., $82.10; Mrs. Ella Ehrlicher, Mo., $85.00. These exceptional earnings show your big possibilities.

I SEND EVERYTHING

Previous experience not necessary. I send you positively everything you need to make good money your very first day. But you must act fast. Simply send your name and address on the coupon or on a penny postcard. By return mail I'll rush to you the complete marvelous facts about this astoundingly simple cash producing idea. Won't cost you a penny. You decide if the earning possibilities are big enough for you. You have everything to gain. Send coupon or penny postcard at once.

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Started Penniless 6½ Months Later Worth $1200.00

"Only 6½ months ago I started with your organization without a penny to my name, and today (I just finished my balance) I am worth a little more than $1,200.00. I can hardly believe it possible—such a success in so short a time." Hans Coordes, Nebraska.

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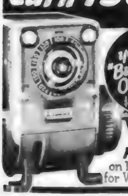

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## Device Tests Auto Driver's Speed In Applying Brakes

Automobile drivers who claim they can "stop on a dime" had a chance to prove their contention in Philadelphia, Pa., recently during a demonstration of a new brake-reaction detonator device. The device consists of a pistol-type ejector which fires a paint-loaded capsule downward at the roadway when the examiner snaps a switch. The driver applies the brakes immediately upon hearing the capsule explode, causing another capsule to explode. The distance between the two paint marks on the roadway indicates the speed of the driver's reaction.

## Synthetic Oil Developed By Government Scientists

A new, secret synthetic oil for aviation watches, clocks and naval and airplane instruments was announced at a recent meeting of the Horological Institute of America, professional society of watch-makers, held in Washington, D. C..

The superior qualities of the new oil at high and low temperatures and for long periods, were described by W. C. Trent of the aeronautical instrument section of the National Bureau of Standards. Formula of the oil is still secret and Mr. Trent refused to disclose its composition on advice of the Navy Department.

An extensive report of the tests performed on the new oil was given, however. It is non-gumming at lower temperatures, does not readily oxidize at high temperatures and has showed excellent performance in 2,000-hour tests.

The new oil seems, at last, to supply the Navy with an oil which can be obtained in large quantities and which will have the superior properties of porpoise jaw oil which is now virtually nonexistent in world markets. The decline of the whaling industry—which used to catch porpoises as a side line—is responsible for the scarcity of porpoise jaw oil.

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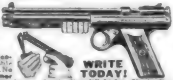

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# Measure Thickness Of Steel Coating With Magnet

A simple magnetic method of measuring the thickness of non-magnetic coatings on steel has been worked out by Abner Brenner, a member of the staff of the National Bureau of Standards in Washington, D. C.

The method, which uses a scale to measure the force with which a permanent magnet is attracted to the object whose coating is being measured, depends on the increase in attraction of a permanent magnet for steel when the two are separated by a non-magnetic coating.

Measurements of commercial coatings of which the actual thicknesses were determined by standard methods yielded results that were accurate within 10 per cent. for most coatings.

## Gauge Shows Cylinder Wear

Garage mechanics can readily determine whether or not a motor requires new piston rings or if a cylinder reboring job is necessary by means of a newly developed gauge. To use the device, the cylinder head and piston are removed and the gauge merely lowered into the bore. The gauge is mounted on a self-centering sled and the amount of cylinder wear is indicated automatically on a calibrated dial.

## California Students Testing Rocket Fuels, Motors

Although highly significant preliminary work on rocket flight is under way at California Institute of Technology in Pasadena, Calif., no immediate flights are anticipated. In fact, a rocket has not yet been designed, the research now being undertaken by five young graduate students in aeronautics consisting of testing a rocket motor to see how fast the burning gases can be made to rush out of its nozzle.

They feed in cold ethylene and oxygen gas at the rate of 1,000 feet a second and hope, by igniting the explosive mixture, to get out a jet traveling at least ten thousand feet a second, or over 5,000 miles an hour. Such a spurt of flame would have a propulsive efficiency greater than present-day airplanes and would not be limited to the atmosphere of the earth as a place for flight. A 30-pound rocket which used such a jet and carried 60 pounds of fuel could go up to heights of 100 miles above the earth where there is practically no atmosphere.

This possibility is of great interest to scientists in the fields of meteorology, astronomy, radio, cosmic radiation and geophysics, as well as to aeronautics.

The experimental rocket motor is a heavy steel cylinder mounted on a spring which will measure the force with which the hot gases are ejected like steam from a tea kettle.

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***FREE*** Write today for Big Free Book. Get the facts about jobs; and low Tuition Offers. Mailing the coupon does NOT obligate you. It obligates ME to tell YOU how you can train for Big Money in a few short weeks. Address Dept. 11-1

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No need to burn midnight oil. Go as slow or as fast as your time will permit. Lessons are so clearly written that beginners can easily understand them and our system of **"practice study"** adds **EXTRA VALUE** to the instruction.

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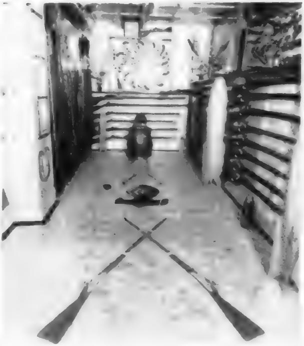
# Hobbyist's Gun Room Has Artistic Floor Covering



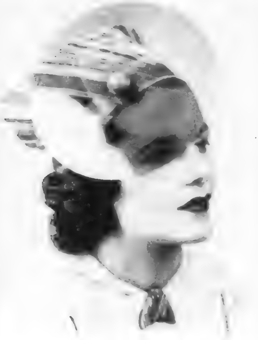
To carry out the decorative scheme of his gun room in which is housed his collection of weapons from all over the world, E. J. Stevens, of Jersey City, N. J., fitted the room with a specially designed Linoleum covering in which a design of crossed guns, armor and pistols is featured. The resultant artistic appearance of the room is shown in the above photo.

# Designer Of Mercury Vapor Engine Stresses Its Value

William L. R. Emmet, designer of the Emmet mercury vapor engine, which uses mercury vapor much as an ordinary steam engine uses steam, claims that his type of engine, if applied to vessels like the "Normandie" would result in fuel and space savings of several hundred thousand dollars a year.

The mercury engine, which has been used to run a power plant at Hartford, Conn., is theoretically more efficient than steam because of the fact that mercury boils at a much higher temperature than water. The efficiency of a steam engine depends on how hot the steam is. Chief hindrance thus far to its acceptance by engineers has been the fact that installation of the mercury engine is extremely expensive because of the high price of mercury. Once installed, however, the mercury does not need to be replaced and it produces more power per pound of fuel than steam does.

## Lady's Hat Has Adjustable Sunshade Attached To Band



Made in a variety of printed sports fabrics, a novel lady's hat is equipped with a semi-transparent adjustable sunshade of acetate plastic in various colors to match the fabric. The plastic disc is attached to the hat band with a button and is easily slid along the brim, without removing the hat, to serve as a sunshade or ornament.

## Engineer Decrys Scientific Value Of Everest Expeditions

Attacks on Mt. Everest, 29,141-foot world summit, are of little scientific value, states John E. Burchard, comparing them, in the Technology Review, to Parsifal's hunt for the Holy Grail.

With nothing of scientific value known or likely to be found above 20,000 feet, the crampon-shod feet of the oxygen-starved climbers wearily plod upward through a barren region, containing nothing but ice, snow and potential hardships.

Five British, two German, and several other expeditions have already attempted to reach Everest's summit, to be turned back, literally within sight of their goal, by weather conditions. In 1924, Mallory and Irvine, members of a British expedition, climbed upward into the cloud-veiled region near the summit pyramid, and were never seen again. No man knows whether they reached the summit or died of cold and oxygen starvation within a few feet of their objective.

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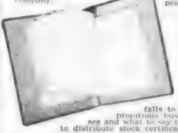

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# Lightweight Crane Simplifies Making Of Motion Pictures

Constructed of duralumin and powered by two electric motors, a new motion picture camera crane invented in Hollywood by E. H. Heyer and E. L. Fischer, keeps the camera level and pointed directly at its object while rolling, and being moved up and sideways. This great freedom of motion facilitates following actor up and down stairs, lifting away over props and furniture, and affords the cameraman a new artistic means of diminishing or increasing the audience's field of view at any rate and from any direction desired. The cameraman operates the turntable by means of pedals and gears, or the table may be operated automatically by means of a drive pulley, and equalizing cable and a set of bevel gears. Thus the cameraman can concentrate on details such as keeping the framing correct. A combination drum and pointer located near the rear of the boom indicate continuously the panning and tilting movements. After the line of travel is once marked upon the drum, the operator thereafter may repeat the same movements by moving the rear end of the crane so the indicator arm follows the course charted on the drum. A catwalk encircles the truck on which the operator can turn the crane, raising or lowering it while swinging it around in a circle. Two motors drive the truck the speed varying from 1/10 to 12 miles an hour. The crane can lift a camera 25 ft. into the air.

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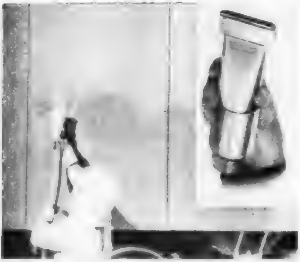
*If you are interested in any of the items mentioned in this issue, send a stamped, return envelope for the address of the manufacturer.*

## Flat-Mouthed Sand Blast Gun Speeds Up Cleaning Job



A new sand blast gun recently produced by an Indiana manufacturer features a specially designed flat-mouthed orifice which is claimed to speed up and simplify the job of preparing wood and steel surfaces for painting and finishing. Attached to any 80 to 100-pound air line, the gun delivers sand particles through its orifice in a flat stream that quickly removes grime, grease and old finishes without cutting or pitting the surfaces.

---

## Aviation Research Speeded By Government

America's aviation research is being speeded to meet the challenge of competition from foreign countries. New research equipment and facilities, including four new wind tunnels, are being rushed to completion at the Langley Field, Va., laboratories of the National Advisory Committee for Aeronautics, already considered the most advanced research establishment for aviation.

This new effort is the reason assigned by the N.A.C.A. for the cancellation this year of the annual aircraft engineering conference usually held in May.

War and commercial planes flying throughout the world reflect the striking advances in aviation made possible in the past few years by research by N.A.C.A. scientists and engineers. Germany and Italy, particularly, have built large research centers for their aviation activities which threatened to surpass American efforts.

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A new British process to keep wool from shrinking is gaining wide interest among textile manufacturers in England.

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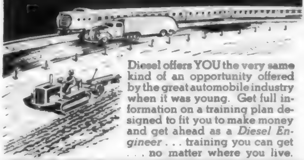

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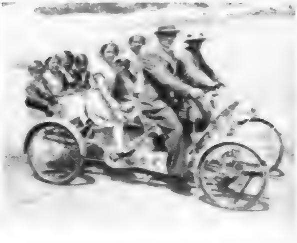
## Constructs Family "Bicycle"



Welding together the frames of two two-seater bicycles and fitting the resultant "body" with a rumble seat and an automobile-type steering gear assembly, a Swiss cycling enthusiast constructed a vehicle which enables him to take his entire family for trips along the countryside. The pedals of the novel vehicle are arranged so that five of the nine passengers can help propel it, as shown above.

## Welded Train Track Tested

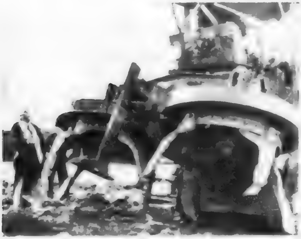
One of the longest stretches of continuous railroad track—a mile-long welded pair of rails—is now in heavy duty service near River Valley, Pa. With 75,000-pound engines hauling from 8 to 10 trains a day, each having up to 125 loaded cars, the continuously welded track is a proving ground where American railroading may learn the ability of this novel trackage fabrication to stand up under heavy traffic. And equally important, the costs of maintenance of this type of track will later be available.

Tests, using short sections of rail placed on ties between rails of the track, have been made on the internal temperature during hot weather. A 1-inch hole, $1\frac{1}{2}$ inches deep, was drilled and filled with mercury. Into the mercury was placed a thermometer.

During a severe hot spell in July, 1936, it was found that while the outside air and the surface of the rail was at a temperature of 104 degrees Fahrenheit, the internal temperature of the rail was as high as 119 degrees Fahrenheit.

Welding of the sections of track into a continuous whole was accomplished by the thermit process wherein the rail ends are brought tightly together, placing a mold around the joint, preheating the ends of the rails and then generating superheated liquid steel by the thermite reaction and letting the molten steel run down into the mold.

# Farm Machine Tills Earth With Revolving Claws



Powered by a powerful gasoline engine, a new English gyro-tiller machine features two sets of huge metal claws which revolve as the machine lumbers across a field, turning over the earth in preparation for planting. In the photograph above, David Lloyd George, famous British statesman, is shown supervising the use of the machine on his estate.

# Local Weather Affects Ocean Currents' Direction

Currents in the ocean, caused by changes in salt content and by temperature changes, have been the subject of a study by Dr. John P. Tully, of the Pacific Biological Station at Nanaimo, British Columbia.

With the cooperation of the Canadian Lighthouse service, Dr. Tully determined that temperature differences in the sea near shore caused a southward flow during the summer, while changes in the sea's saltiness caused an opposing northward current. Which way the current will flow at a given time is determined by local weather conditions, he reports. The factors determining currents are many, but solar heat and land drainage are constant, leaving wind force and direction as the factors causing changes in the ocean currents.

A Government scientist tells four precautions that will lessen danger of fires on farms: use fire-resistant roofing; dispose of waste and rubbish; never use gasoline or kerosene to start or revive a fire; and guard against overheating of stoves and furnaces, and clean smoke pipes at least once a year.

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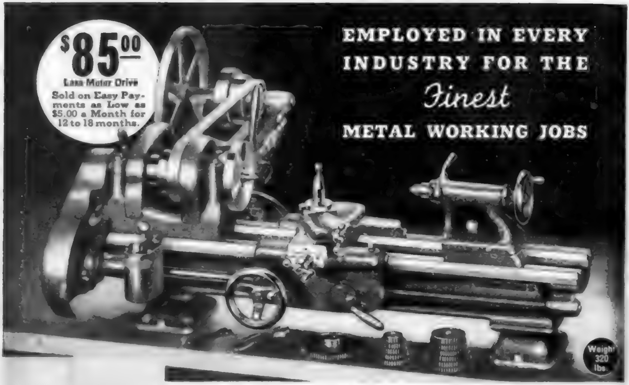
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Vol. XXI
No. 3
January
1939

Edward Savage, king of toy inventors, just "sits and thinks" and ideas begin a'poppin'.

Here's how America's No. 1 toy inventor makes $10,000 on a single idea. Try it!

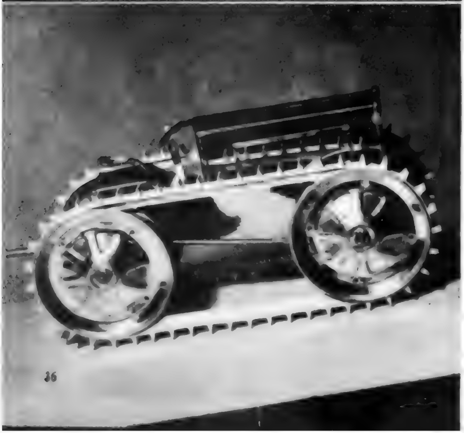
by Stanley Gerstin

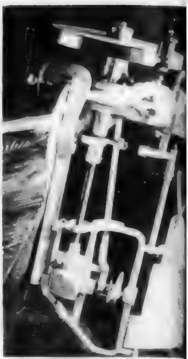
# Toy Invention!

## BIG MONEY FOR HOME WORKSHOP FANS

TOY invention is a little-worked "gold mine" for the truly inventive craftsman or home workshop fan. Devise a novel action for a mechanical toy and toy manufacturers will give you royalties of 3 to 5 per cent for permission to make and market the item.

After conceiving the idea, Savage works out its details on paper. Below: The climbing tractor was an early success and helped make him famous.





Before turning toy inventor, Savage designed one of the first outboards. The feature of this one was the rudder which could be raised above the boats's keel. It was designed in 1898.

Suppose a million replicas of your toy are sold—you will make a modest fortune from one such invention! Many toy inventors have sold more than a million and are still selling. All you have to do is think up an original idea, patent it, make a working model and find a manufacturer who recognizes the toy's possibilities. He will do the rest, with no investment on your part, and he'll be glad of the chance.

But before you start toying with toys in your home workshop, take a lead from Edward S. Savage, the man whose inventive genius has earned him the reputation of being the "best all-round toy inventor in the United States." Maybe that's saying a lot for any one man, but those are the words of H. G. Fisher, president of the Toy Manufacturers Asso-

Savage is shown in his basement workshop where his famous toy characters are brought to life. Donald Duck pop-up was conceived in the privacy of this workshop. Note its action shown above left.

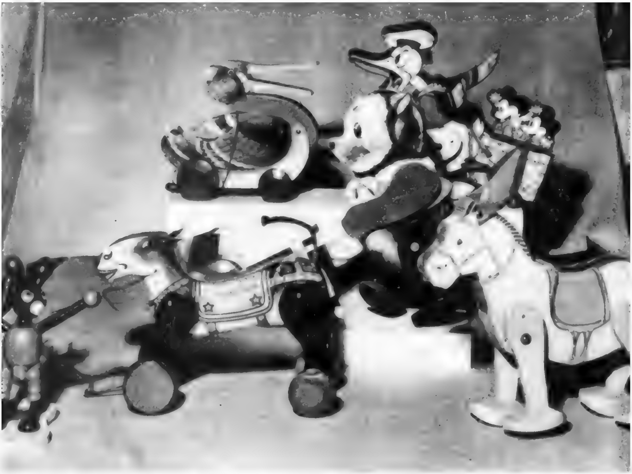
ciation of the U. S. Contrary to popular conceptions of inventors, Edward Savage is a practical man not given to crack-brained schemes, and there is nothing about his manner, dress or home that suggested to the writer that he was in the presence of the most nimble-brained toy inventor in the country.

Savage spends much of his time in the drafting room on the third floor of his home, and when not there, may be found tinkering away in his basement workshop. There, in a small room cluttered with strips of wood and pieces of metal, amid wire, springs and a hundred different pieces of hardware ("junk" to the uninitiated), he makes moving creations of his ideas with the aid of a band saw, a drill and a lathe.

He is a modest little man, about 58, with a quiet way of speaking and a kind twinkle in his blue-gray eyes. Son of a Middle-West minister, he was graduated as a mechanical engineer from the University of Minnesota in 1897, with a record of an invention already to his credit. His ideas, which began popping when he was a boy of 14, eventually led him into toy inventing, which he found to be a lucrative pastime.

He has made $10,000 on a single idea, not once, but often! Four million of his "pop-up" toys have been sold in the last five years. He originated the crawling bug, the climbing tractor and the kicking donkey. He invented the wobble toy—he got $8,000 for the wobble idea!

That, briefly, is the father and dean of modern toy inventors, who lives in a world of toys in the basement workshop of his home in Rochester, N. Y. His cronies are a colorful conglomeration of fantastic figures: Jack the Kicking Donkey, Peter the Walking Pig, Pluto the Pop-Up Kritter, Gabby the Goose, Lop-Eared Louie, Tail Spin Tabby, Snoopy the Sniffer, the Climbing Tractor and many others.



In the foreground are shown the originals of Savage's pop-up, kicking donkey and wobble toys. Others followed rapidly in various forms and characters.

His first brain-child, conceived when he was still a youngster, was a 3-foot boat powered with the works from a clock. The novelty of it was a special vane which was attached to the rudder and could be set to hold any course in the wind. That was about the year 1890, when the idea of a toy motorboat caught the fancy of sailor and landlubber alike, and marked the beginning of a long series of inventions by this young experimenter who, a few years later, was to design an outboard with a special rudder that could be raised above the boat's keel.

But it was his ingenuity in toy inventing that really made him famous. His first commercial toy was a balloon-type figure, called the walking pig, with tin legs and a bellows under its belly. As the air in the balloon escaped through the bellows, which acted as an air motor, it actuated the legs so that the pig waddled across the floor, uttering a squeal as it went along. The walking pig looked very amusing and, in Savage's opinion, was one of the most original toys produced. It saw the light in 1902 and proved to be a great comical success, if not a financial one.

Still believing that there was a fortune to be made from toy inventions, Savage looked about for something that would fit his ideas of what an acceptable toy should have. He reasoned that a toy should have plenty of movement and that its action should be novel enough to evoke surprise and enthusiasm from grown-ups as well as from children. He shrewdly calculated that the simple toys could be made and sold at a lower price than the complicated ones, and would have the largest number of sales. With this in mind, it wasn't long before he hit upon the idea of the crawling bug, which was the original of a series of crawling toys destined to make him tops in his field.

The crawling bug had a cylindrical wheel containing a viscous compound that retarded the action of the spring so that the bug crawled along slowly. It proved so successful that other toys were designed on the same principle and the idea netted Inventor Savage $10,000 on the bug alone.

It was the viscous principle, protected by patents, that led to the idea of the climbing tractor. The tractor also had the viscous retard in it which acted as a governor and was equipped with a rubber "caterpillar" tread so that the tractor could climb over practically anything. It netted its inventor well over $5,000.

As his toy inventions continued to prove successful, Savage began devoting more and more of his time to their development. In his search for ideas of novel and original action, he conceived the kicking donkey which threw up its rear as it was pulled along. It was designed after 1927 and has had a better than a 5-year run, which, in the toy world, is considered very good. During the five years of its life the kicking donkey, which "hee-haws" as it kicks, together with other toys on the same principle, have sold more than 500,000 and earned about $15,000!

Savage not only cashed-in on the "kick" idea, but it led to the motor driven "wobble" idea which netted him an additional $8,000. The "wobble" was devised for walking toys, known as the Walky Balky Backup toys and the Go'n' Back Jumbo which sway from side to side as they walk. The mechanism is so geared that the animal goes forward and then backward.

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## What A Toy Inventor Should Know

1. **Prepare a detailed drawing of your invention for the Patent Office. A working model is not required. Write to the Patent Office, Washington, D. C., for information.**
2. **Be sure your patent application covers every principle of your invention. Overlooking one principle while patenting the other leaves a loophole for someone to steal your ideas. Reputable patent attorneys advertise in MECHANIX ILLUSTRATED.**
3. **Register the name of your invention if you think it has possibilities. However, a name is not necessary.**
4. **Manufacturers are chiefly interested in the mechanical mechanism, but in making it, you should know in what it will fit.**
5. **If your invention is designed for a duck, you don't have to make a duck. The manufacturer will design the toy for size, shape and color.**
6. **If you are not equipped to construct your invention, or if you can only make part of it, commercial model-makers will make it for you. Don't be afraid to describe your invention fully to them.**
7. **The three requisites for a successful toy are simplicity, originality and low price.**
8. **Sell your toys on a royalty basis. Don't offer to help finance them.**

### Some of the leading toy manufacturers are:

**Fisher-Price Toys Inc., East Aurora, N. Y.**
**Parker Bros., Inc., Salem, Mass.**
**Milton Bradley Co., Springfield, Mass.**
**A. I. Root Co., Medina, Ohio.**
**John C. Turner Corp., Wapakoneta, Ohio.**
**Fletcher Game Co., 6227 South Wood St., Chicago, Ill.**
**Louis Marks & Co., 200 5th Ave., N. Y.**
**Knickerbocker Toy Co., Inc., 200 5th Ave., N. Y.**

### Model makers are:

**Alexander C. Parlini, 64 Fulton St., New York, N. Y.**
**Bedford Aluminum Specialty Co., 31 Walker St., New York, N. Y.**
**DeHart Mfg. Co. Inc., 418 W. 27th St., N. Y., N. Y.**
**Interstate Mechanical Laboratories, Inc., 533 W. 57th St., N. Y., N. Y.**

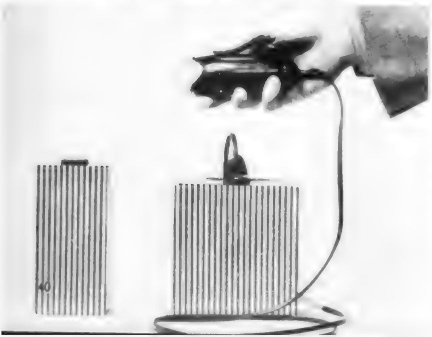
The crawling bugs, using viscous fluid as a retard, were Savage's first successful toys that started him on the road to fame and fortune. The same principle was later used successfully in the climbing tractor and other toys.

## New Fire Boat Rated As Most Powerful

CLAIMED to be the most powerful of its type in the world, a fireboat recently constructed for the New York (N. Y.) Fire Department has a pumping rating of 22,500 gallons of water per minute at a nozzle pressure of 150 pounds per square inch. Powered by Diesel-Electric engines, the fireboat has a top speed of 16 knots per hour.

## Couple Travels 7,100 Miles On Bicycle

RIDING a tandem bicycle which they named the "Spirit of Fun," James P. Young and his wife Elizabeth are shown posing at the San Francisco end of the Golden Gate Bridge after having completed a trip of 7,100 miles, believed to be the longest cycle trip ever made in the United States. The couple equipped the two-seater bike with front and rear lights to facilitate night cycling and with both foot and hand operated brakes to insure safety when coasting down some of the steep grades encountered enroute.



## Battery Has Plug For Electric Shaver

SPECIALLY designed for travelers and campers, newly developed portable dry batteries are equipped with standard two-prong sockets which permit plugging in of electric shavers. The batteries are available in both small and large sizes, as shown in photo, and deliver 110 volts of direct current which will operate practically all types of AC-DC electric shavers.

## High School Student Builds Speedy Auto

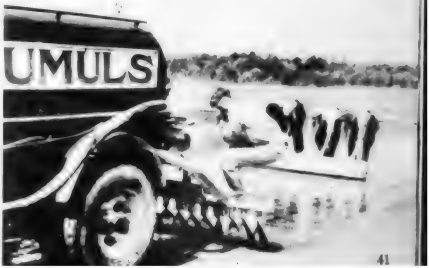
A HOME-BUILT auto constructed by Mylio Ozuk, a high school student in Chicago, Ill., is said to travel at a speed of 130 m.p.h. Bug-like in appearance, the car has a strap metal frame over which a canvas hood can be draped to form a housing or "body" for the driver and the V-8 motor which is mounted at the center of the chassis directly behind the driver's seat.

## "Pistol" Branding Iron Operated By Battery

RESEMBLING a pistol in appearance, having a barrel-shaped body and a trigger-type switch which controls its operation, a new electric branding iron for use on livestock has been invented by an English farm owner. Electric current for operating the iron is supplied by an ordinary six-volt auto battery connected to the base of the iron's pistol-grip by means of a lengthy cable. The brand features removable letters and numerals so that various combinations can be made up.

## Airport Runway Made Of Cotton Fabric

THE photograph at right shows a step in the construction of the world's first cotton runway for the landing and take-off of airplanes. The workmen are unrolling cotton fabric behind a truck which spreads a tar preparation to hold the fabric down. Approximately one million bales of cotton are expected to be used to complete the runway, which is located on Reilly Field at Fort McClellan, Alabama.



## Folding Porch Serves As Trailer Room

SERVING as an added room when in camp, a recently marketed trailer porch weighs only 150 pounds and folds into a compact bundle that can be carried underneath the trailer when traveling. The porch is approximately 8x6x6½ feet in size when erected and is screened and weather-stripped to make it bug-proof. A full size door is also featured.

## Flexible Tubing Made From Synthetic Resin

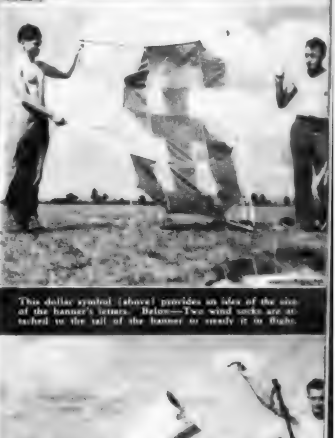
SO FLEXIBLE that it is easily tied in a knot without injuring it, a new tubing for industrial use is made from synthetic resin, which is claimed to be the only commercially-known substance that is inert and completely insoluble in gasoline, oil, ethers, alcohols, etc. Available in sizes up to one-half-inch in diameter, the tubing is said to retain its flexibility over a wide range of temperatures and shows no trace of wear, fatigue or deterioration over long periods of service.

## Meter Measures Auto Engine Vibration

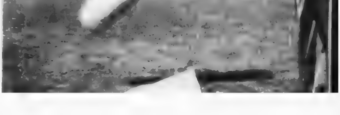
A NEW portable deflection indicator for automotive use enables engineers to measure vibrations at any point on an automobile motor. In operation, a beam of light cast against a small screen on the face of the device exaggerates movements 250 times and thus clearly establishes the magnitude and frequency of the vibration by tracing a line of light that becomes wavy in appearance, the length of the waves indicating the extent of the vibration.

# Messages in the Sky

After the advertising flight has been made, the plane tows the banner back to the airport where the pilot trips a release, dropping the sign to the ground (top). The letters forming the banner's message are set into line on tape leaders by means of spring clips (above).



This dollar symbol (above) provides an idea of the size of the banner's letters. Below—Two wind socks are attached to the tail of the banner to steady it in flight.



TOWED over summer and winter resorts by low flying airplanes, aerial advertising banners are helping to popularize many products by bringing the manufacturer's message before the upturned eyes of millions of people attracted by the roar of the aircraft's motor. Some of the banners are 100 feet long, excluding the tow rope which is usually about 150 feet long.

The banners are made up of separate letters, each of which is about 5½ feet high. The letters are cut from heavy cloth and are attached to bamboo sticks by means of special tapes fitted with clips. The clips also serve to attach the letters to one another to form the words of the message. The banner is "launched" by being laid flat on the ground, jumping into the air when the tow plane has taken up the slack in the lengthy tow rope by leaving the ground.

# Congratulations, General Arnold!

IT IS with great pleasure that the publisher and editors of MECHANIX ILLUSTRATED call the attention of our vast army of readers to the announcement that Major General Henry H. Arnold, Air Corps, has been appointed Chief of the Air Corps, making him "boss" of Uncle Sam's flying soldiers. For several years, starting in 1928, General Arnold edited a "Plane Talk" department which appeared monthly in MI (then known as Modern Mechanix), and even today he is a frequent

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Left—In 1934 General Arnold led a flight of bombing planes from Washington, D. C., to Fairbanks, Alaska, being awarded the Mackay Trophy for the exploit. Below—Being sworn in as new Chief of the Air Corps.

## New Iceboat Features Short Air-Flow Body

REFLECTING the aerodynamic lines of modern autos and airplanes, a new type of streamlined iceboat features a protected cockpit built into an air-flow body on which the after end tapers to a narrow fin to avoid air suction. The craft is steered by a horizontal cockpit wheel which controls the movable front runner.

## Garage Device Cleans Old Crankcase Oil

SUITABLE for garage or filling station use, a new oil reclaiming device is claimed to purify old crankcase oil so that it can be used over and over again, reducing lubrication expenses as much as 80%. The dirty oil is sucked into one end of the device by means of an electric pump, as shown in photo at right, after which it is passed through Fuller's Earth to emerge from a valve as a clear, re-usable lubricant from which the gums, resins and tars formed by motor use have been removed.

## Powered Soil Tiller Does Numerous Jobs

HARDLY larger than an ordinary wheel-barrow and powered by a small gasoline engine, a newly developed tiller will plow, pulverize and drag the earth to a depth of about one foot all in one operation. The machine is geared for two forward speeds—a low speed for very rough work that permits working of 1½ acres per day and a high gear which permits operation at a speed of about 2½ miles per hours when larger jobs are undertaken.

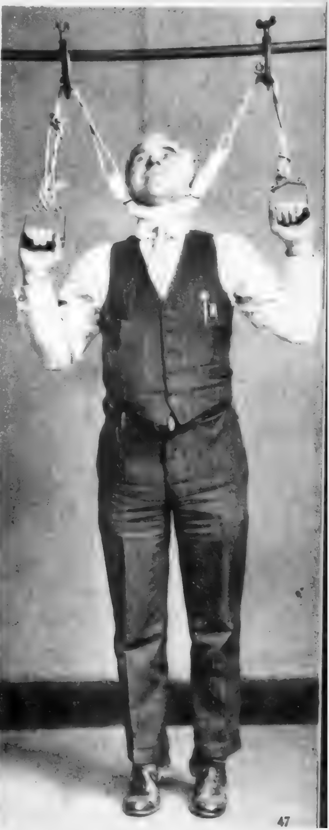
# Cracking

How government investigators crack down on dispensers of mechanical cure-alls to a gullible public, is told here in this story.

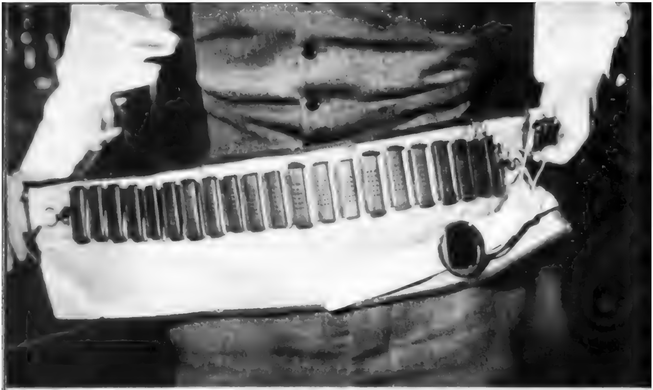
# Down On Quacks

### by James N. Miller

FOR more than 20 years Post Office Inspectors D. F. Angier and C. E. Dunbar have been waging a battle against mail-order quacks whose wonder-working lotions and impressive appearing contraptions bamboozle the weak, the credulous and the infirm out of untold millions of dollars each year. These government men are cracking down on purveyors of trick gadgets who will sell a gullible public anything from pink pills to stretching devices. The "stretching device" is alleged to increase a wee person's height three to five inches. They sell weird-looking masks to be worn over the nose and mouth to "cure" tuberculosis and rheumatism; "electric belts" sold as a sure corrective for liver trouble and paralysis; medicines for determining whether an expectant mother will produce a boy or a girl; gadgets for making lean folks fat and plump folks thin; skull caps supposed to be able to grow hair on a bald spot. And there's even an apparatus for making two pounds of butter grow in place of one pound. Almost without exception such masterpieces of charlatanry are either



Inspector D. F. Angier of the Post Office Department isn't trying to hang himself. He is just illustrating a stretching device sold by a "pro-quack."



Government men stopped the sale of this electric belt (above) sold as a cure for kidney and liver trouble, paralysis, tuberculosis and other diseases. (P.S. It didn't work.) The nose straightener shown at left is supposed to do its magical work while you sleep. Just clamp it on—and presto! But post office inspectors clamped down, and so, no presto!

worthless or else the claims for them are fantastically exaggerated, the inspectors find.

Scores of quacks have been conducting enterprises and will sell you eye-glasses with little more data than your age and ability to pay the bill. Not so long ago in Chicago, Uncle Sam put out of business a company selling half a million dollars worth of spectacles a year. During the Federal investigation preceding the issuance of a fraud order it was revealed that the company had been operating the same business for at least 10 years, but under 20 different names!

Their system consisted in claiming to furnish you by mail with eye-glasses "as good as you could buy at the best class of optical store but at much reduced prices!" They advertised on a tremendous scale in newspapers and magazines. In case you answered one of their ads here's what would happen: First, you would receive advertising literature, flamboyantly worded, and promising to send you a test lens for determining at home exactly what was the matter with your eyesight. Next you would send in a certain sum of money and in a few days your test lens would arrive.

Of course all this sounds fairly legitimate. But there were several catches in the situation. After you sent in the "specifications" for your eye-glasses you would receive them soon enough. And at first glance they might appear to be satisfactory. However, pretty soon you would discover either that they did not fit as well as they seemed to at first, that they caused severe headaches, or that they did not enable you to see or read as well as you had been led to believe. Result? You would send them back under the terms of the much advertised guarantee to fit.

In such case the manufacturers were pretty "cagey." They would not, in any instance, refund your money but instead would con-

Hands of Inspector C. E. Dunbar of the Post Office shown (above) testing a phony electric device. It is made of aluminum and filled with sulphur and graphite and is wholly inert no matter where you place the lever.

Above: If the peg swings right, the egg is a female. If it swings left, it is a male! These "sex" testers really depend for swing on steadiness of the hand.

This is not a football nose guard shown at right, but an alleged cure for tuberculosis. Twenty drops of liquid solution containing creosote, iodine, alcohol and oil of eucalyptus are placed in the mask and supposed to do the trick!

tinue sending you eye-glasses until you got sick and tired of returning them.

Government specialists proved conclusively by tests that most of the test lenses were made of glass that had been ground inaccurately. Furthermore, none of the spectacles were able to correct astigmatism, which requires the use of especially devised cylinders made from formulas that fit only individual cases. And yet something like 8 people out of 10, (Federal authorities say) afflicted with faulty vision, have some sort of astigmatism.

Writing under various assumed names, special agents of Uncle Sam wrote 40 letters

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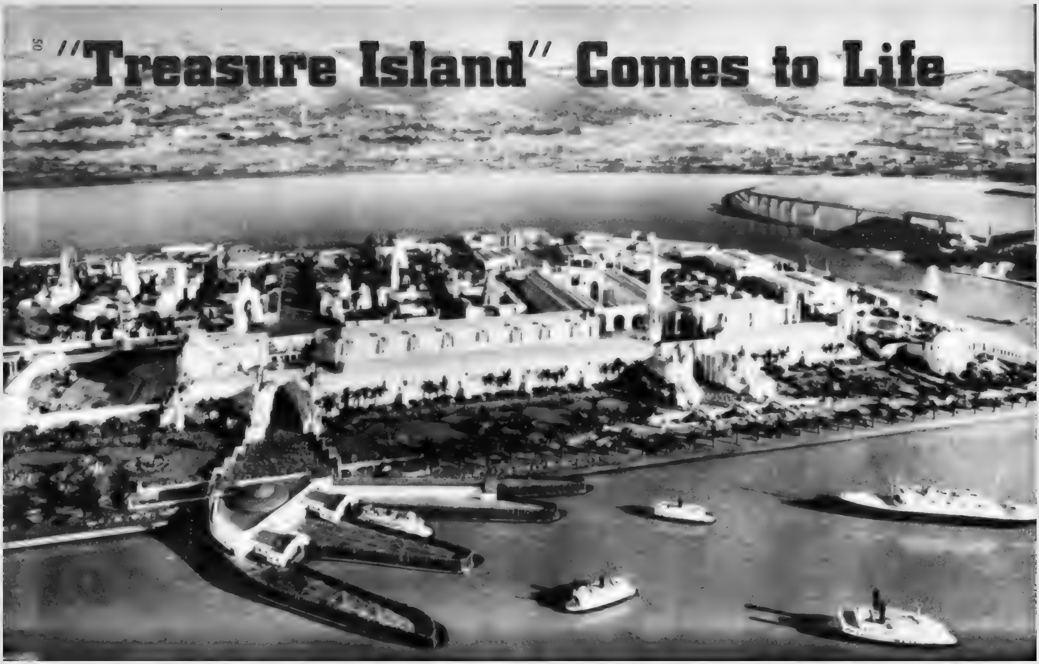
Right. The device held by this inspector is supposed to make water radio-active. Such devices owe their radio-activity, if any, to parts made of carnotite ore. They are usually ineffective.

# "Treasure Island" Comes to Life



TRAVELERS with a fanciful turn of mind may think they are witnessing the reemergence, in San Francisco Bay, of the mythical land of Mu, complete with towers, battlements, and gay banners, when the San Francisco Fair opens February 18. For the 1939 Golden Gate International Exposition, the West's World's Fair, is situated on an island in the bay which rose from the depths, not by magical hocus-pocus, but by sound modern engineering. This island, 400 acres in area and rising about 13 feet above sea level, glitters with glamorous buildings suggesting the mysterious Orient. The site is called Treasure Island. The name is in keeping with the general theme of the Exposition, which is known as a "Pageant of the Pacific," and which lays its main stress on the romance and culture of the nations around the Western ocean.

The 1939 exposition, a $50,000,000 Fair, will remain open until December 2. Its attendance will probably be 20,000,000. They will get to Treasure Island by two routes: 1. Via ferry from San Francisco across the bay; 2. by the $77,000,000 San Francisco—Oakland Bay bridge, in private cars and buses.

This World's Fair, whose design is a romantic one is in the form of an ancient walled city, employing a type of architecture blending Maya, Incan, Malayan and Cambodian forms together with a distinctive contemporary treatment.

The tallest point on the island is the Tower of the Sun, rising from the great central court to a height of 400 feet. Most characteristic, perhaps, of the entire Fair is the design of the main gates. These, known as "Elephant Towers" because of the stylized elephant heads employed, most arrestingly strike the notes of Oriental grandeur, of pageantry, of the dream city and the never-never land.

Buildings are finished with iridescent stucco that reflects sunlight or floodlights. This finish, a new development in exterior surfacing, contains millions of tiny particles of mica.

One of the most interesting projects in connection with the development of Treasure Island is the landscaping. The horticultural program has cost $1,500,000, and is turning the sandy island into a wonderland of subtropical trees and plants. All these were taken to the island by barge, and transplanted in sand that first had been washed free of brine and then covered with loam.

Among the unique features of this Fair are:

1. An air line under glass—Pan-American Airways has recently agreed to operate its Pacific Clippers from Treasure Island during the Fair, permitting, for the first time in World's Fair history, the public to view maintenance of operating planes, and watch arrivals and departures. The Port of the Trade Winds, a cove formed between Treasure Island and Yerba Buena, will be a seaplane base for the Clipper ships. After the Fair, Pan-American will base permanently on Treasure Island.

2. The Pacific Basin Area—for the first time in history, the art and culture of the area known to scholars as the "Pacific Basin," will be assembled. This exhibit, which already is attracting worldwide attention, will be housed under one roof, in Pacific House.

3. The Story of the American Indian—under the direction of George Creel, eminent publicist, the United States Government in a $1,500,000 exhibit will dramatize the story of the American Indian and his importance in the nation's cultural scheme. The Indian will be shown in his true light, as a master artist-craftsman, the best anywhere in the world.

In addition to these outstanding features, visitors will see: The Cavalcade of the Golden West, a super-pageant of western history; Chinatown, a $1,500,000 authentic reproduction of an ancient Chinese village; Treasure Mountain, a model mountain 50 feet high and 400 feet long, with working demonstrations of every type of Western mining; a Fine Arts Palace, with a history-making collection of Old Masters, unusual examples of the decorative arts, and the Japanese National Treasure, along with many other items; the Story of Land and Sea, central unit of the University of California exhibit, being a five-minute trip from the depths of the sea to a mountain crag; many beautiful foreign governmental exhibits, along with the displays of leading American industries.

The emphasis of the fair will be on the things of a materialistic machine age and will be presented as the realization of a philosopher's dream. That is, that the machine age has liberated humanity from numberless humdrum tasks thus opening the possibilities of a greater leisure and a broader culture.

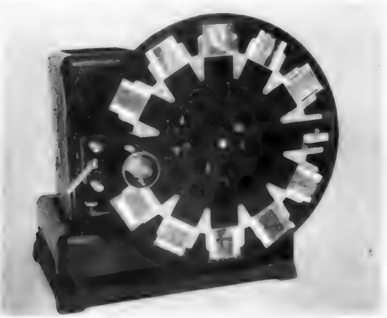
Originally intended as a celebration of the two greatest bridges in the world, the San Francisco-Oakland and the Golden Gate bridges, the fair has grown far beyond that and is now an example of the greatness of Western progress.

## Golf Course Has Elevator

ERECTED on the course of the Pittsburgh Field Club near Pittsburgh, Pa., a specially constructed elevator saves golfers a tedious climb up a steep hill located between the 17th and 18th holes. After playing the 17th hole, the players enter the elevator and are lifted 64 feet to a 274-foot runway which leads to the 18th tee.

## Sails Ocean Single-Handed

SAILING a 30-foot sloop which he constructed at a cost of $1,200, Heinrich Garbers, 29-year-old employee of a Hamburg, Germany, ship building firm, recently completed a solo voyage from Hamburg to Brooklyn, N. Y. The trip required three months, stops being made at Cuxhaven, Germany; Falmouth, England, and the Azores.

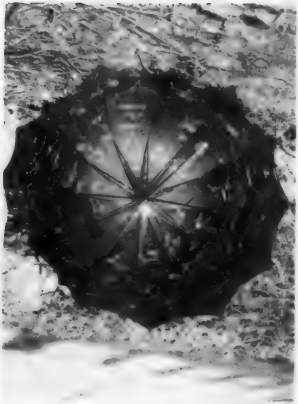


## Projector Flashes 12 Slides Automatically

SPECIALLY designed for educational, lecture and advertising use, a new automatic projector permits 12 slides to be shown over and over again, in consecutive order, for intervals ranging from 10 seconds to one minute. The essential feature of the projector is a revolving circular disc with twelve 2x2-inch slots around its outer edge, which serve to hold the slides to be projected, as shown in the photo at left. An AC-DC motor operates the circular disc

## Straws Make Own Sodas

STRAWS which automatically impart a fruit flavor and appropriate color when dipped into a glass of ordinary carbonated water have been placed on the market by a Hollywood inventor. The straws are marked according to flavor and the user merely makes a selection, dips the straw into the water and sucks to make a tasty soda.

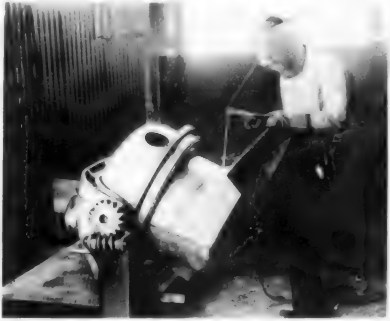


## Umbrella Is "Planetarium"

A "PLANETARIUM" inside an umbrella is the invention of a German astronomer. The relative positions of the various constellations are patterned on the inside of the umbrella cloth, as shown in photo, and by pointing the umbrella at the North Star and turning it slowly a comparative study of the real sky and pattern can be made.

## Table Revolves Work During Welding Job

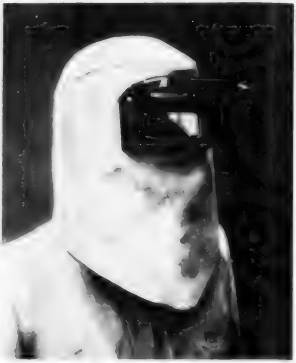
ENABLING a welder to work with greater convenience when handling tanks and other circular products, a newly developed workshop table is powered by a one-quarter horsepower engine and revolves automatically at varying speeds which are governed by a handwheel. The table features eight slots for bolting the work in position and can be tilted at various angles by means of a hand-operated worm gear and wheel which are clearly shown in the photo.



## Sterilizers Lock Like Vault

LOCKED with all the precision of a bank vault, their doors fitted with the same type of imposing wheels and levers, the sterilizers of the Royal College of Surgeons in Lincoln's Inn, London, England, are rated among the most efficient ever devised. As shown above, the heavy metal doors require the operator to use two hands in closing them. Meters set in the wall above the sterilizer compartments enable the operator to keep constant check of conditions.

## Leather Helmet Aids Welder



MANUFACTURED of selected chrome leather on a specially constructed vulcanized fiber headgear, a new welding helmet is designed for use in tight places where the conventional type of shield requires too much space. Adjustable to various head sizes by means of a conveniently located screw fitting, the helmet features a built-in dual glass-holder, the outer colored glass of which can be flipped up to permit inspection of the weld through a clear inner glass.

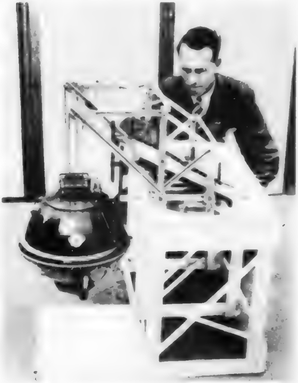
## Truck Loads, Unloads Material Quickly

POWERED by an eight-cylinder V-type diesel engine developing 180 horsepower, a newly developed truck is said to be capable of handling an average of 85 cubic yards of material an hour. An especially designed tail gate makes it possible to load the truck to its maximum capacity regardless of the type of material being carried, while a built-in sliding bulkhead enables the material to be unloaded in 45 seconds.

## First-Day Cancellation Gives Stamp Great Value

A ONE-CENT Civil War stamp, said to be worth $50,000 is shown in the hand of Warren R. Du Bois, who purchased it as part of a $300 collection. The value is not attached to the stamp itself but to the cancellation date, August 17, 1861, in Baltimore, Md. Since the first stamps were issued in the Civil War, experts have been seeking it in vain.

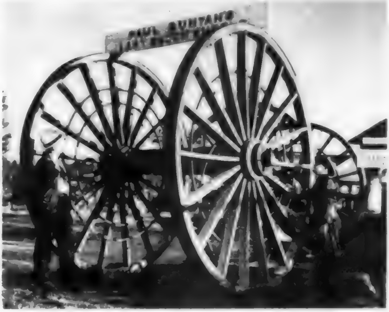
## New Lifesaving Device Is Designed For Ocean Vessels



LOSS of life by drowning or exposure to the elements as the result of shipwreck will be eliminated if vessels are equipped with this "life ball," according to the inventor, Ronald T. G. Mason, of England. Although the outer shell might turn completely over in rough seas, the inside section containing the passengers would maintain its equilibrium.

## Giant Wheels Become Roadside Attraction

THIS pair of gigantic wagon wheels once were used to move logs from the forest to a sawmill in the timber region of Montana. Now they adorn the roadside at Lakeside, Montana, a sawmill town. An enterprising gasoline filling station owner who acquired them, has dubbed them, "Paul Bunyan's last wagon wheels." Their size can be judged when compared to the six-foot tall man standing at the left. Notice the wooden axle.



# Guardians Of The Airways

Above—Government aviation inspectors must be A-1 pilots. Inspector Povey prepares to go aloft with a fledgling flyer who seeks a pilot's certificate

When a plane passes a licensing test it gets an "NC" and an identification number.

Inspecting a plane before renewing its license, the inspector climbs atop the wing to examine it minutely for flaws. Planes are inspected at regular intervals

Only after the applicant has proved his flying ability and knowledge of aeronautics to the inspector's satisfaction does he receive a pilot's certificate

### by Leonard H. Engel

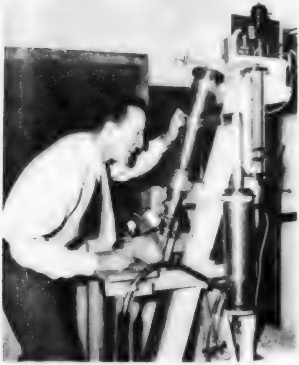
UNCLE SAM has 58 "policemen of the air," who are on the job daily to help make American aviation safe. They are the inspectors of the Air Commerce Bureau.

Employees of the government agency currently charged with watching over the air industry, the inspectors maintain a service which has been carried on since the Bureau was established in 1927 and has been in operation steadily and without noticeable effect from the legislative storm that has been stirred over aviation during the past two or three years. Like the show, the inspection service must go on.

I spent nine hours watching Leonard Povey, ace stunt flyer before he joined the Bu-

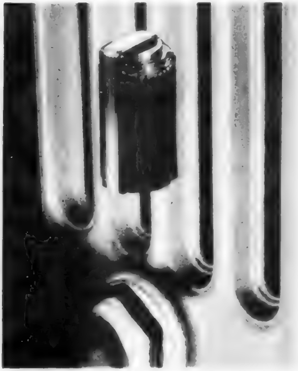
[*Continued on page* 118]

## Build Powerful Microscope



USING high speed electrons instead of light and focused by magnetic and electrostatic lenses, a newly developed microscope has a magnifying power of 100,000 diameters. Developed by Dr. William V. Houston and Hugh Bradner at California Institute of Technology, the microscope may be used in astronomy to convert infra-red and ultraviolet rays to visible light.

## New Valve Betters Radiator



DESIGNED for use on one-pipe steam heating systems to meet the conditions of thermostatically controlled automatic firing, where there are frequent cycles of intense heat and then no heat at all, a new radiator valve automatically adjusts its speed of air venting to conform with the pressure and may be set so that all rooms receive approximately the same amount of heat.

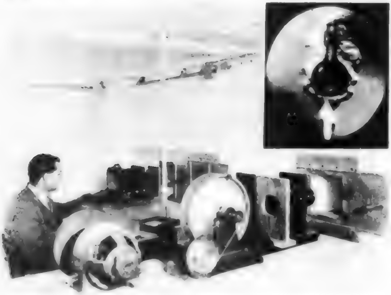
---

## Radio Altimeter Gives Plane's True Height

OPERATED by radio, a newly developed altimeter informs an airplane pilot of his exact height above ground or water whether he is just skimming the surface or flying at great altitudes. The signals, which travel at 186,000 miles per second, fluctuate at the slightest change in the terrain below the plane. The new instrument may eliminate aircraft accidents which are caused by the fact that present day barometric (air pressure) altimeters do not give an accurate reading.

## New Lightweight Bus Has Two Sections

THIS forty-seven-foot lightweight aluminum bus, largest in the world and specially designed to make possible the carrying of more passengers in fewer buses, has a jointed body with a flexible rubber hood. It carries 120 to 140 persons. The bus will speed smoothly over bumps and depressions at fifty miles an hour The increased carrying capacity will be particularly valuable during the morning and afternoon rush hours.



## Camera Photographs Hot Air Currents

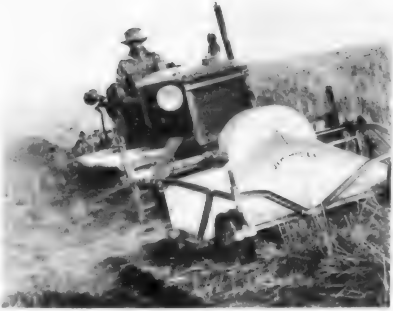
A NEW camera has been constructed which takes pictures of currents of hot air. Although the eye has been capable of seeing these currents or heat waves, until now, a camera has been unable to catch them. The equipment necessary to take these pictures is shown in the large photograph at the left, while the insert shows the actual heat waves as they move upward around a glass flask.

## "Skim-Board" Gives New Thrill To Water

THE latest addition to aquatic sports is this "skim-board," the invention of Emil Hansen, a Media, Pa., automobile mechanic. It is nine feet long, weighs ninety pounds, and is made in four sections. It is driven by a four-horsepower engine that gives it a speed of twenty miles an hour, and carries sufficient gasoline for an hour's trip. The photograph shows the "skim-board" assembled, with Mr. Hansen about to start the motor

## Tractor Attachment Simplifies Farming

A TRACTOR attachment invented by James Magee and Lew Jain, of Genessee, Idaho, enables wheat stubble to be used as fertilizer, cutting the stubble off close to the ground and spreading it evenly over the plowed earth by means of a built-in air blower. Ordinarily the wheat stubble is burned and burning and plowing are two separate jobs, but the new invention makes plowing and cutting the stubble one operation.

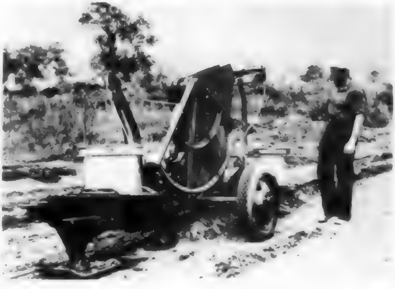


## Ground Radio Device Teaches Beam Flying

DESIGNED to help familiarize flight students with various types of beam signals so they may interpret them correctly when practicing radio beam flying, a new class room device produces dot-dash code signals that can be heard in headphones by four students at a time. With the use of blackboard diagrams and the manually-operated device, a clear picture of an aural radio range can be presented.

## Machine Plows Phone Wires Under Ground

ELIMINATING the need for telephone poles with their unsightly maze of overhead wires, a newly developed machine digs a furrow in the ground and plows under the wire to a depth of 24 inches, the wire being fed to it from spools like thread through a needle. The wire can be plowed under almost as fast as a man can walk. Following the plowing operation, the furrow is obliterated by dragging a heavy roller over it with a tractor.



# MI Readers'

IF YOU fail to read the advertising section of MECHANIX ILLUSTRATED you are cheating yourself of learning about many valuable opportunities, for advertisers spend thousands of dollars yearly in producing interesting booklets on a variety of subjects which can help you to secure training for a better paid job, make your home more comfortable and attractive, simplify the problem of automobile maintenance, improve your health, increase the scope of your home workshop activities, etc.

To bring these opportunities to your attention and to simplify your obtaining information from the advertisements that interest you, all the offers made in this issue, with the exception of those in the classified section, are listed on this and the opposite page. Study the list carefully.

It is the function of the Readers' Service Bureau to act as a clearing house for both readers and advertisers. The listing gives offers made, the cost of each, and a convenient identifying number. To simplify the ordering of booklets, samples, catalogs, etc., the bureau will forward your requests to three, or less, of the firms listed.

To take advantage of this service, merely write your name and address on the coupon, mark the numbers of the offers wanted, and mail the coupon to Readers' Service Bureau, MECHANIX ILLUSTRATED, 1501 Broadway, New York, N. Y. We will do the rest.

If the offer selected is listed as "free," all you have to do is to send in the correctly marked coupon. If there is a slight charge (usually only 3c and rarely more than 10c, to cover cost of mailing bulky catalogs, etc.), be sure to include the correct amount with the coupon. U. S. postage stamps are acceptable.

**NOTICE**

**Don't fail to examine all advertisements in this issue and the offer they make. We are willing to forward three of your requests for booklets, etc., but don't let this stop you from ordering additional material directly from other advertisers. REMEMBER — read the advertisements *carefully*.**

| Offer No. | Firm | Type of Business | Offer Made | Charge | Page |
|---|---|---|---|---|---|
| 1 | Allied Radio | Radio Supplies | Catalog | Free | 124 |
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| 3 | American School | Instruction, General | Bulletin | Free | 11 |
| 4 | American School | Instruction, Air Conditioning | Details | Free | 26 |
| 5 | American School | Instruction, Drafting | Bulletin | Free | 28 |
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| 7 | American School | Instruction, Diesel | Bulletin | Free | 22 |
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| 9 | American School of Photography | Instructions | Booklet | Free | 30 |
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| 11 | Atlas Press | Tools | Catalog | Free | 19 |
| 12 | Charles Atlas | Health Instruction | Book | Free | 29 |
| 13 | Bass Camera Co | Cameras, Supplies | Price List | Free | 128 |
| 14 | Bausch & Lomb | Film Slide Viewer | Folder | Free | 120 |
| 15 | Bausch & Lomb | Microscopes | Details | Free | 124 |
| 16 | Benjamin Air Rifle | Air Rifles | Targets | Free | 26 |
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| 25 | College of Swedish Massage | Instruction | Booklet | Free | 142 |
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| 28 | Coyne Electrical School | Instruction, Radio | Book | Free | 20 |
| 29 | Delta Mfg. | Woodworking | Book | 10 Cents | 10 |
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| 33 | Dremel Mfg. Co. | Tools | Booklet | Free | 131 |
| 34 | Electro Torch | Welding Equipment | Details | Free | 126 |
| 35 | Electrical Salvage | Radio & Elec. Supplies | Catalog | 3 Cents Stp | 134 |
| 36 | Victor J. Evans Co. | Patent Attorneys | Books | Free | 9 |
| 37 | Franklin Institute | Instruction | Book | Free | 15 |
| 38 | G.H.Q. Motors | Model Engines | Catalog | 3 Cents | 130 |
| 39 | Gunmetal Co. | Plating | Details | Free | 134 |
| 40 | Harley Davidson Motors | Motorcycles | Magazine | Free | 134 |
| 41 | Hemphill Diesel Schools | Instruction | Booklet | Free | 31 |
| 42 | Hobart Bros. | Welding Equipment | Details | Free (2) | 23, 129 |
| 43 | Indiana Laboratories | Liquid-Fixer | Sample | Free | 131 |
| 44 | International Correspondence Schools | Instruction | Booklet | Free | 3 |
| 45 | International Correspondence Schools | Instruction | Booklet | Free | 17 |
| 46 | Institute of Applied Science | Instruction | Details | Free | 30 |
| 47 | Invention & Finance Magazine | Inventors | Details | Free | 8 |
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| 49 | Kelsey Presses | Printing Presses | Catalog | Free | 142 |

# Service Bureau

| Offer No. | Firm | Type of Business | Offer Made | Charge | Page |
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| 51 | LaSalle Extension University | Instruction, Law | Books | Free | 26 |
| 52 | Lincoln Airplane & Flying School | Instruction | Details | Free | 33 |
| 53 | Lionel Trains Corp. | Model Trains | Catalog | 10 Cents | 123 |
| 54 | Long Eakins Co. | Potato Chips Outfit | Booklet | Free | 21 |
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| 58 | Michael Angelo Studios | Instruction, Statuary | | | 130 |
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| 60 | Carl Miller | Patent Attorneys | Book and Form | Free | 10 |
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| 62 | N-Larg-O Company | Photo Enlarger | Circular | Free | 128 |
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| 64 | National Radio Institute | Instruction, Radio | Details | Free | 6 & 7 |
| 65 | National Schools | Instruction, Diesel | Book | Free | 25 |
| 66 | National Schools | Instruction, Radio | Book | Free | 32 |
| 67 | New York Institute of Photography | Instruction | Booklet | Free | 142 |
| 68 | N. W. School of Taxidermy | Instruction | Book | Free (2) | 126, 132 |
| 69 | C. A. O'Brien & Hyman Berman | Patent Attorneys | Book | Free | 13 |
| 70 | Patterson School | Instruction | Book | Free | 23 |
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| 79 | Silver Mfg. Co. | Radio | Catalog | Free | 30 |
| 80 | Standard Business Training Inst. | Instructions | Booklet | Free | 142 |
| 81 | Smooth-On-Mfg. | Cement | Book | Free | 121 |
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| 97 | World's Products Co. | Sell Products | Details | Free | 144 |

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1501 Broadway, New York, N. Y.

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I am enclosing cents in stamps
(Ignore this line if all offers are free.)

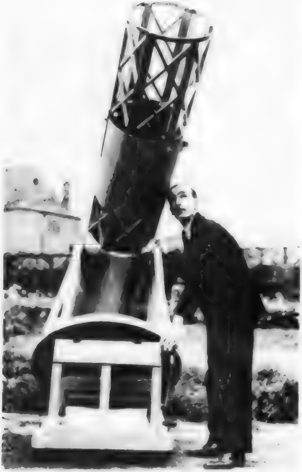
Name

Address

City and State

Note: This offer expires February 1, 1939. After this date, write directly to advertisers for offers.

M.I.-1

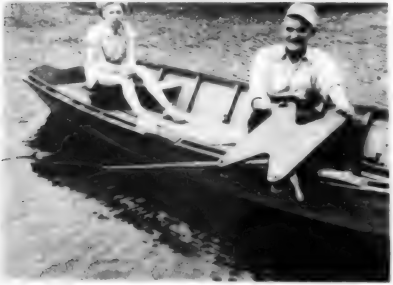


## Builds Reflecting Telescope

REQUIRING three years to construct, a reflecting telescope built by Reginald R. Brooks, of London, England, is believed to be the largest of its kind ever built by an amateur astronomer, featuring a magnification of 500 times. He now plans to build an observatory to house the telescope.

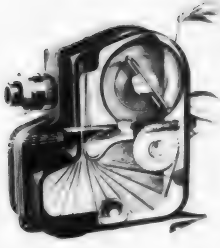
## Water Heater Burns Trash

FITTED with a thermostatic control that keeps the water at a constant temperature, a new combination incinerator-heater unit makes use of garbage and other kitchen refuse as fuel with which to heat the water stored in a built-in tank. Ashes are easily removed from a large door in the bottom.



## "Mechanical Oars" Revolutionize Rowing

ELIMINATING the need for constantly craning one's neck while rowing in order to see where the boat is heading, "mechanical oars" invented by Charles Morris, of Portland, Oregon, enable the rower to face toward the bow and move the boat forward while pulling back on the oars in the usual manner. The oars (reversed in photo to show handle) lock to the gunwale to avoid loss.



## Low-Priced Movie Camera

CLAIMED to have 60 new features, many of which are found only in high-priced cameras, a new low-priced movie camera makes movie-taking easier and more pleasurable. Sketch shows the built-in view finder.

## Hand Lever Loads Air Pistol

AVAILABLE in single or eight-shot models, a new compressed air pistol features a small hand lever, five or six strokes of which provide enough power to shoot lead pellets through quarter-inch pine at 10 yards.

## Cargo Ship Features Arc Welded Hull

CLAIMED to be the largest of its type ever launched on the Great Lakes, a new cargo vessel (above) features a 300-foot hull fabricated from rolled steel channels joined together by over 40 miles of arc welded seams (right). Powered by two 750 horsepower diesel engines, the vessel carries a cargo of 1,200,000 gallons of kerosene at a speed of 15 m.p.h. The ship's five storage tanks are nickel-lined, permitting rapid cleaning to accommodate different cargoes.

# MI Boat Design Started

### by F. Pierce Sherry

SEVERAL years ago this magazine published the plans and specifications for a 15-foot sailing sloop. Throughout the small-boat fraternity the design struck a popular note because it was simple in construction, inexpensive to build, and gave promise of good speed.

To the sailor with limited means, limited facilities and equipment, yet withal a keen desire for one-design competition, this boat from the board of S. S. Rabl, of Baltimore, was the fulfillment of a dream, for there is every argument in favor of one-design racing—it is boat-for-boat competition with a premium on personal skill; one's competitors are closely bunched for maximum enjoyment of the thrills of racing tactics, and at the finish line each contestant knows just how he has fared, without having to wait on the calculations of a handicap committee. Popular one-design sloops of equal inches were being featured at the time, but these boats were beyond the means of many sailing enthusiasts.

And so the SUN Class was launched, and it soon justified its conception. The boat is 15 feet, 3 inches o.a.l., with a beam of 4 feet, 11½ inches. It is of the centerboard type and construction is simplicity itself. It has none of the conventional frames, thereby

Above—Part of the Richardson Bay Yacht Club SUN fleet being towed to a regatta at Richmond, Calif. Below—A fleet of SUN Class sloops starting a race.

# Popular Racing Class

Right—Creating a pretty picture, a SUN Class Sloop sails through a choppy sea. Above—SUN Class races are thrilling because competitors "bunch" together. Below—Two SUN boats approaching the Richardson Bay Yacht Club's quarters—an old ship's hull.

eliminating the laborious "laying down" routine involved in preparing for the planking of other designs. The planking on the SUN is of the diagonal type, built up from a simplified mold layout. Out of the experience of those who built the earlier boats

[*Continued on page* 118]

# "MEN WITH WINGS" Contest Attracts Many Entries

This thrilling crash scene is from "Men With Wings," the first all-Technicolor aviation picture, which stars popular Fred MacMurray, Louise Campbell and Ray Milland.

HUNDREDS of entries in the nation-wide "Men With Wings" Contest have already been received, but you still have time (midnight, Dec. 27, 1938) to prepare and mail in your entry in competition for the free round-trip airline flight to Hollywood, Calif., and the other 22 excellent prizes being offered by Paramount Pictures, producers of the first all-Technicolor aviation production — "Men With Wings," and MECHANIX ILLUSTRATED, co-sponsors of the aviation contest. Read the contest rules, which appear on page 122, and then enter the contest NOW before it is too late. The contest questions (in box at left) are based on aviation facts and you can look up the answers in standard reference books, but it won't be half as much fun as seeing Paramount Picture's new all-Technicolor production—"Men With Wings"—at your local theatre and learning the answers from its colorful and thrilling scenes.

A complete listing and photographs of many of the prizes which will be awarded in the contest, appeared in the December issue (back copies are available from our Greenwich,

[*Continued on page 122*]

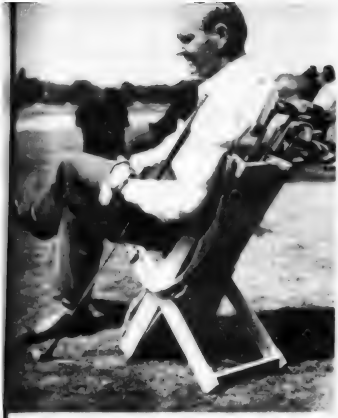
CHECK ONE SQUARE FOR EACH QUESTION.

1. The first successful airplane flight was made by the Wrights on December 17, 1903 ☐ December 17, 1907 ☐
2. The United States Army had airplanes before the World War Yes ☐ No ☐
3. When Alcock and Brown made the first successful flight across the Atlantic Ocean they landed in Long Island ☐ Newfoundland ☐ Ireland ☐
4. Colonel Charles Lindbergh started his famous trans-Atlantic flight from Orchard Beach, Maine ☐ Curtiss Field, L. I. ☐
5. The name of Colonel Lindbergh's monoplane was Winnie Mae ☐ Spirit of St. Louis ☐ Old Glory ☐
6. The early pioneers were more interested in the development of the airplane as a means of transportation than in its possible value as a weapon of war Yes ☐ No ☐
7. The first scheduled air mail planes were flown by U. S. Army pilots Yes ☐ No ☐
8. Commercial pilots must first serve as test pilots Yes ☐ No ☐
9. Corrigan flew to Ireland with the aid of a "gyro-pilot" and other modern direction-finding instruments Yes ☐ No ☐
10. Wing flaps were invented to make an airplane fly faster Yes ☐ No ☐

Name and Address

Age

After checking off your answers to the above questions, tear out this coupon (or make a copy of it) and send it, together with your 25 to 50 word letter on the subject—"Who Is Aviation's Greatest Hero?"—to Contest Editor, MECHANIX ILLUSTRATED, 1501 Broadway, New York, N. Y.



## Invents Golfer's Chair-Bag

DR. J. H. HARRIS, of New York, N. Y., is shown demonstrating the combination golf bag and chair which he invented. The chair is a simple folding X-type to the back of which is attached a heavy canvas bag that holds a complete set of golf clubs. The chair has a canvas seat and is easily carried by means of a stout web belt which is placed conveniently over the shoulder.

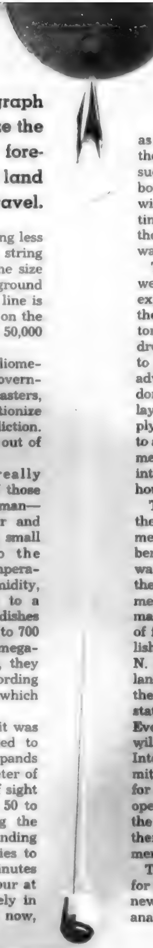
## Cups Hold Roast To Platter

NO LONGER need you worry about the possibility of the Sunday roast or fowl sliding from the platter when you undertake to carve it, for a new type of vacuum cup appliance recently placed on the market is the answer to the problem. The cups are held to the platter by suction and are fitted with steel pins which impale the meat, keeping it from slipping. They are available in sets of four.

## Gauge Shows Diesel's Firing Pressure

COMPRISED of two measuring elements, a newly developed gauge shows the compression and firing pressure of a diesel engine while it is running at full speed. The compression is shown on a visual gauge while a neon light flasher provides a positive means of detecting piston movement. A simple adjustment automatically corrects the readings for the inertia of the moving engine parts, providing accurate measurements that simplify detection of trouble.

# RADIO ALOFT



### The new radiometeorograph is destined to revolutionize the whole field of weather forecasting—making the air, land and sea lanes safer for travel.

### by Allan Finn

A MAGIC little gadget, weighing less than a pound, is tied to a string dangling from a balloon about the size of Sally Rand's "bubble." As the ground man gives the signal, the anchor line is released and the balloon takes it on the lam for a nearly vertical flight 50,000 feet into the stratosphere.

The magic gadget is the radiometeorograph, developed by the Government's scientific weather forecasters, and it seems destined to revolutionize the whole field of weather prediction. In fact, it may take meteorology out of the "prediction" field entirely.

This radiometeorograph is really nothing more than a hook-up of those three old friends of the weather man—the thermometer, the barometer and the hygrometer. Attached to a small balloon, the trio go aloft to the stratosphere and measures temperature, barometric pressure and humidity, transmitting the data by radio to a ground station as it ascends. It dishes out the signals at intervals of 400 to 700 feet at anywhere from 60 to 150 megacycles. As the signals come in, they control a pen which sets itself according to the pitch of the radio note and which does the plotting automatically.

Within 20 minutes of the time it was released, the balloon has climbed to 17,000 feet, and as it rises it expands from its original 4 feet to a diameter of 15 to 18 feet. Soon it is far out of sight in an atmosphere which may be 50 to 60 degrees below zero, dangling the weather box that taps the surrounding elements and flashes their qualities to the men on earth. In another 20 minutes the bag is at 34,000 feet; in an hour at 50,000 feet, where it floats serenely in space touched by few men. But now, as it gradually rises in the thin air of the stratosphere, the expanding balloon suddenly bursts. The magic weather box hurtles downward, certain to crash with a shattering impact—but wait! A tiny, silk parachute suddenly opens and the instruments descend gently into the waiting arms of the weathermen below.

This radio aloft that forecasts the weather is still in a comparatively semi-experimental stage, but it already has the knack of scouring the weather factories above the earth that was only a dream 25 years ago. Soon it will be able to tell the man in the streets, long in advance of present warnings, when to don an overcoat, carry an umbrella or lay in an extra ton of coal. It will supply valuable information to the farmer, to air lines, transport companies, amusement interests, ships and a dozen other interests, some of which can't wait hours for weather dope.

This is the "new promise" with which the Weather Bureau has been experimenting a year to bring about for the benefit of every man and woman who wakes up in the morning and peers out the window to see what the weather menu of the day looks like. Six permanent stations using the new method of forecasting have already been established at Oklahoma, Omaha, Fargo, N. D., Sault Ste. Marie, Canada, Oakland, Calif., and Nashville, Tenn. Soon the Bureau hopes to be operating 100 stations reporting every six hours. Eventually, a network of robot stations will be strung around the world. The International Meteorological Committee is now laying the groundwork for it. Several stations have been operated for sometime in Europe and the Arctic, and in a number of lands there is feverish activity in the development of instruments.

The magic box which is responsible for this furore owes its being to that new meteorological wrinkle, air mass analysis. This study has moved old-

# Forecasts the Weather

fashioned forecasting from a two-dimensional to a three-dimensional basis.

Until this was possible, weather prediction was grounded largely in a correlation of certain types of pressure distribution and pressure change with subsequent change. The forecaster operated on the principle that weather conditions traveled in a fairly regular manner. By studying past maps he could estimate from current chartings likely occurrences in the location of low or high pressure areas (weather making forces) and the accompanying conditions characteristic of their pressure formations.

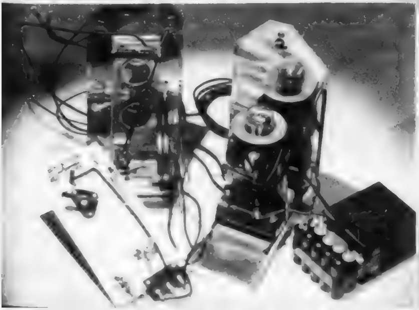
This, synoptic plotting, still is chiefly depended upon for basic prognostications. But forecasters long realized this method was too empirical and beyond the point of dependability. They knew the stratosphere was their true field of activity. They knew that actually interactions between air masses up there comprising the systems of low and high barometric pressure were more active in the processes of weather phenomena than conditions observed at the earth's surface. They knew that, there, the weather factories brew fair or foul weather.

The question has been how to get at this source of precious weather data. For years the forecaster strung along with what mountain stations, pilot balloons, cloud studies and kites provided him. Then came the airplane, which filled the bill up to July 1, 1938, when the robot stations were established. Army, Navy and civilian flyers went up at 27 stations, usually to about 17,000 feet, carrying a meteorograph which scratched a record of the elements on a blackened cylinder turned by clockwork.

Ascents were started at 4 a. m., several hours in advance of the synoptic charting, but the enterprise had many drawbacks. The flights were risky (ten men lost their lives), could not be made in dirty weather (when data was most sorely needed), and the elapsed time precluded rapid evaluation of the recordings. The cost of such flights was $20 to $25.

Radio was the obvious solution, but progress in developing a practical telemeter was slow. Although suggested 25 years ago, the first really successful radio results were not obtained until by the Russians in 1930. In the United States first regular successful radiometeorographic soundings were made

[*Continued on page 126*]



Above: Weather observers receiving radio signals from radiometeorograph being carried aloft by balloon to a height of 30,000 feet. Pressure, temperature and humidity data are transmitted by radio to the ground station and automatically recorded on the recorder shown at right.

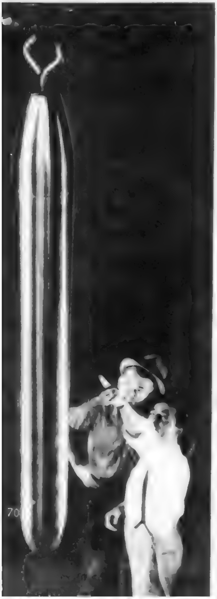
Left: This is the trio that makes up the radiometeorograph. It consists of pressure, temperature and humidity recorders. The transmitter tubes and battery are at right. At left are pressure, temperature and humidity elements which go aloft.

## Obsolete Street Cars Converted Into Tourist Homes

TRUCKED to a grove on the shores of a small nearby lake where they were set on block foundations and remodeled, old street cars of Asheville, North Carolina, are now serving as over-night homes for tourists, as shown in photos above. Note the outside water supply tank.

## Mop Device Snaps On Broom Handle

INSTANTLY attached to a broom, a newly developed device converts the broom into a dust mop (above).



## "Time Capsule" Buried At Fair Site

CONSTRUCTED of special metals that will resist corrosion, a "Time Capsule" (left) in which books, films, and other objects of 20th century life were placed, was recently buried on the site of the New York 1939 World's Fair with the expectation that it will be recovered by archaeologists about 5,000 years from now.

## Suit Protects Football Player

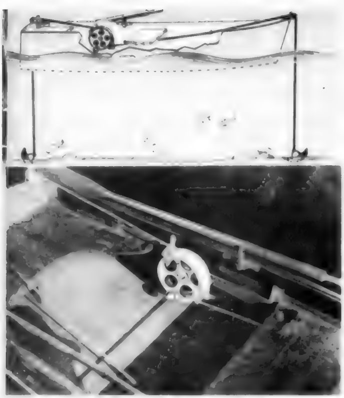
STRAPPED over the wearer's shoulders like a harness and fastened to the waist in the back, a newly devised shock absorber suit enables football players to play more vigorously during practice periods without fear of personal injury. The suit, shown being demonstrated by Dan Rhule, tackle on the University of Kansas team, is officially known as "blocking armor."

## Lamplight Rivals Daylight

A LIGHTING system which, it is claimed, produces the nearest thing to natural daylight thus far achieved by any man-made illuminant of comparable efficiency, has been installed in a barber shop in Nela Park, Cleveland. Devised by a well known electrical firm, the system consists of 34 tubular fluorescent lumiline lamps which are rated as 10 times more efficient than ordinary filament-type lamps.

## "Collars" Reduce Gas Range Fuel Bills

PREVENTING outside air currents from dissipating the heat and intensifying the flame directed on the bottom of a pot, newly developed asbestos collars (insert) for gas range use are claimed to reduce fuel bills as much as 25%. The collars are made in various sizes and are easily placed in position atop the burners by merely removing the grates upon which the pots rest, as demonstrated by lady in photo.



## Anchor Reel Aids Fishermen

ESPECIALLY designed for use by fishermen, a newly invented anchor rope reel eliminates the noise and water disturbance usually attendant when raising and lowering the anchor and enables the boat to be anchored, bow and stern, without leaving the rowing seat. The reel is provided with five large openings on each side which allow the reeled-in rope to dry rapidly. It is designed for use with either one or two anchors and has a rope capacity of 150 feet.

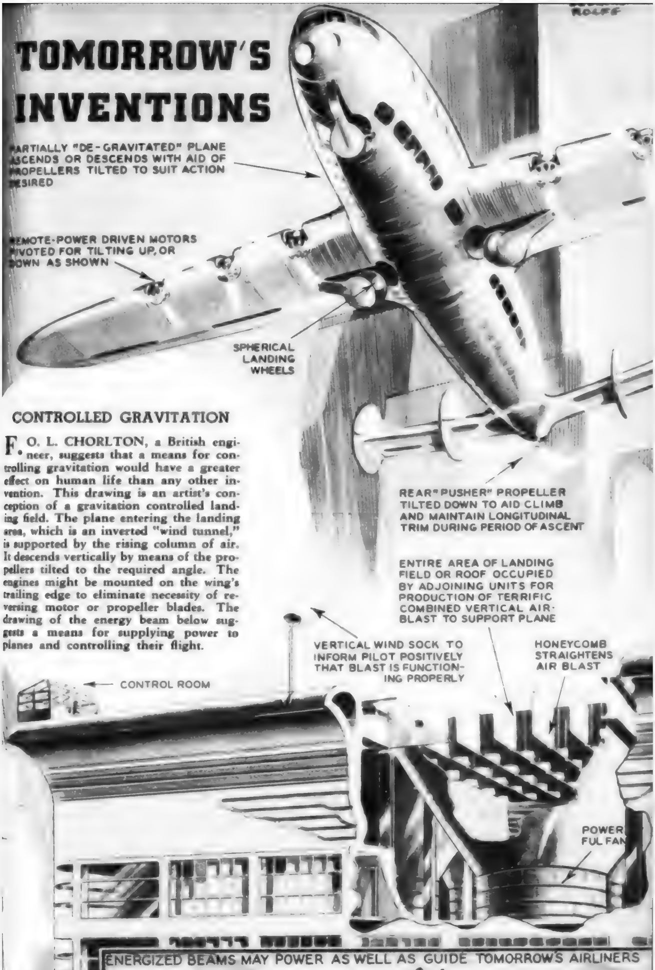
## Simple Photo Meter Devised

SIMPLE to use, being a direct-reading extinction type that requires no references to charts or calculations, a newly developed inexpensive enlarging exposure meter has no moving parts. Constructed sturdily enough to last indefinitely under ordinary use, the meter has no bulb to burn out or consume current. Movement about the easel is free, as there is no cord to plug in and hinder the action of the meter, as shown in the accompanying photo.

## Foot-Rest Improves Nursery Swing

THANKS to an understanding mother, "swing time" is now a real joy for infants. Mrs. Marie Hartman, of St. Louis, Mo., has invented a simple foot-rest attachment for canvas nursery swings manufactured by her husband that not only relieves the pressure under the baby's knees when his legs are hanging limply, but which also provides a medium for exercising the leg muscles when the baby pushes against it. Pushing against the foot-rest also serves to motivate the swing.

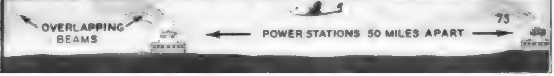
# TOMORROW'S INVENTIONS


ROLFE
ARTIALLY "DE-GRAVITATED" PLANE SCENDS OR DESCENDS WITH AID OF ROPELLERS TILTED TO SUIT ACTION ESIRED
EMOTE-POWER DRIVEN MOTORS IVOTED FOR TILTING UP, OR OWN AS SHOWN
SPHERICAL LANDING WHEELS
REAR "PUSHER" PROPELLER TILTED DOWN TO AID CLIMB AND MAINTAIN LONGITUDINAL TRIM DURING PERIOD OF ASCENT
ENTIRE AREA OF LANDING FIELD OR ROOF OCCUPIED BY ADJOINING UNITS FOR PRODUCTION OF TERRIFIC COMBINED VERTICAL AIR-BLAST TO SUPPORT PLANE
VERTICAL WIND SOCK TO INFORM PILOT POSITIVELY THAT BLAST IS FUNCTIONING PROPERLY
HONEYCOMB STRAIGHTENS AIR BLAST
CONTROL ROOM
POWERFUL FAN

## CONTROLLED GRAVITATION

F. O. L. CHORLTON, a British engineer, suggests that a means for controlling gravitation would have a greater effect on human life than any other invention. This drawing is an artist's conception of a gravitation controlled landing field. The plane entering the landing area, which is an inverted "wind tunnel," is supported by the rising column of air. It descends vertically by means of the propellers tilted to the required angle. The engines might be mounted on the wing's trailing edge to eliminate necessity of reversing motor or propeller blades. The drawing of the energy beam below suggests a means for supplying power to planes and controlling their flight.

ENERGIZED BEAMS MAY POWER AS WELL AS GUIDE TOMORROW'S AIRLINERS


OVERLAPPING BEAMS
POWER STATIONS 50 MILES APART

## Instrument Checks Eyesight

A NEW scientific instrument by means of which doctors can ascertain whether a person is afflicted with night blindness, or inability of the eye to adapt itself to dim light, has been developed by a well known optical firm. The subject faces the instrument with eyes fixed on a bright light which is suddenly turned off. The time then required to detect a dim light determines the subject's rating.

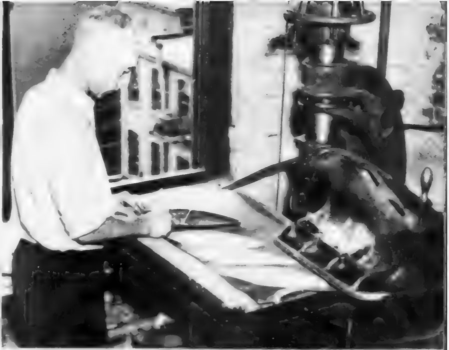
## Rack Salvages Oil From Can

CONSTRUCTED from heavy sheet iron and easily attached to the wall of a garage, a newly developed rack serves to salvage oil that clings to the sides and bottom of small and large dispensing cans used to service cars. Draining about 25 supposedly empty cans is said to yield as much as one quart of oil, which flows into a funnel-shaped receptacle at the base of the stand, as shown in the photograph.

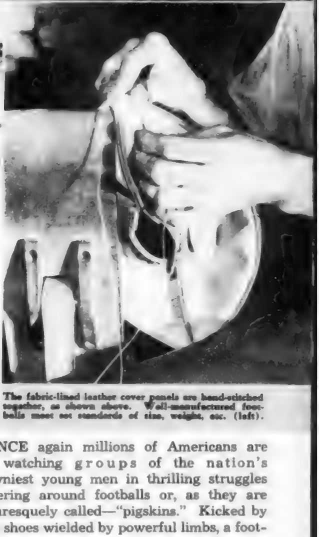
## First Air Mail Pickup To Start New Service

THE first actual air mail pickups to be made without the necessity of landing will soon be in service along two eastern air mail routes. The pickup plane is equipped with a long cable to which is attached a small anchor-shaped hook which serves to snare a bag of mail fastened to a long rope that is strung between two poles set up in a field, as shown in photo. Mail is landed by reversing the process, providing service for towns not located along regular air mail routes.

First step in making a football is the cutting of elliptical cover panels from tough, high grade leather (right). A fabric lining is then cemented to each panel (below).



# The Making of a "PIGSKIN"



The fabric-lined leather cover panels are hand-stitched together, as shown above. Well-manufactured footballs meet set standards of size, weight, etc. (left).

ONCE again millions of Americans are watching groups of the nation's brawniest young men in thrilling struggles centering around footballs or, as they are picturesquely called—"pigskins." Kicked by hard shoes wielded by powerful limbs, a football must be made by skilled hands from the best of materials if it is to survive, even for a short time, the gruelling punishment meted to it on the gridiron. In the photos on this page, MI shows you how a football is made.

## School Sound System Has Many Features

A NEWLY developed sound system control cabinet for schools features a radio receiver, a phonograph turntable, a microphone, a powerful monitoring loudspeaker and switch controls for each of 20 classrooms. The unit permits distribution of radio broadcasts, recorded music and announcements, as well as two-way communication between the principal's office and any classroom or laboratory.

## "Electric Nurse" Is Sleepwalker's Guard

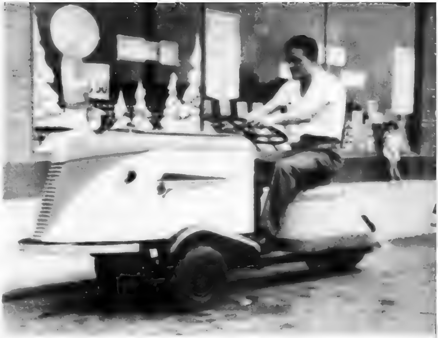
AN "ELECTRIC nurse" in the form of a photo-electric relay and a light source was devised by an electrical engineer in Erie, Pa., to warn him whenever his father, a convalescent, had an attack of sleep walking. The light source was placed at the foot of the father's bed in such a position as to direct a beam which could not be avoided if he left the bed, as shown in photo. Interception of the light beam set a buzzer going, serving to awaken the son sleeping in a nearby room.

## Discovers Valuable Chemical Formula

CHANGING boric acid—the kind you put in your eyes—from a powdery state to a crystal as hard as a rock is the chemical feat recently accomplished by Leon McCulloch, research chemist for a well known electrical parts manufacturer. The new laboratory discovery will be helpful in commercial glass manufacture due to its controllable melting point and will supplant boric oxide in a number of processes.

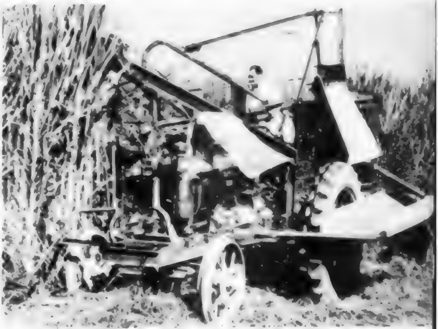
## Low-Powered Vehicle Hauls Heavy Load

POWERED by a one-horsepower four-stroke motor and featuring a two-speed gear and a fully sprung frame, both front and rear, a new type of motor vehicle is said to carry a load of 500 pounds at a cost of less than half a cent per mile. The carrier compartment forms the nose of the three-wheeled vehicle and is streamlined in the modern manner, as shown in the photo at right. Note the protective bumper and mudguards



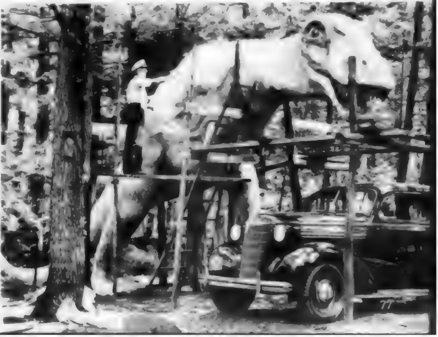
## Sugar Cane Machine Does Job Of 50 Men

CONSTRUCTED by Allen Ramsey Wurtele, of New Orleans, La., at a cost of only $500, a new sugar cane harvester machine is said to do the work of 50 men. In a recent test, the machine cut through a field of 12-foot cane, topping, stripping and bunching the stalks at the rate of a ton every three minutes. Until Wurtele's invention, sugar cane harvesting was strictly a hand job with laborers swinging machetes in the same manner as for the first crop in 1795.

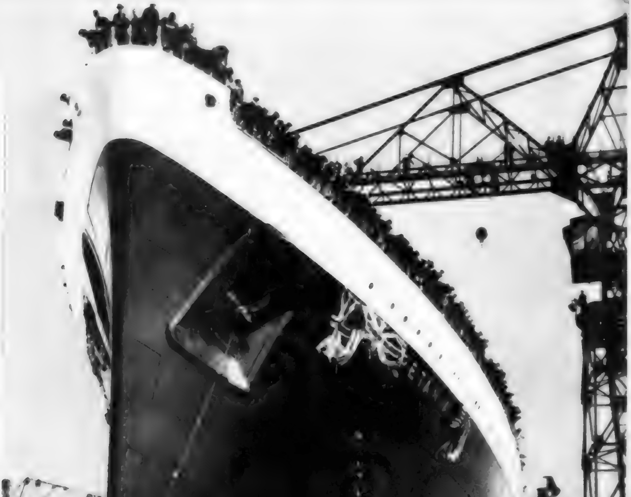


## Reproduces Full-Size Monsters In Plaster

CREATING life-sized plaster replicas of monsters that roamed the earth centuries ago and setting them up in a "prehistoric garden" on his estate is the novel hobby of Paul Domke, of Ossineke, Mich. The photograph shows him at work on a reproduction of a giant King Lizard which measures 53 feet from snout to tip of tail. The modern auto under scaffold serves as size comparison.



# Britain's New "Sea Queen"



THE imposing photograph on the opposite page shows Britain's new "Queen of the Sea," the *Mauretania*, being christened in a ship yard at Birkenhead, England. Bearer of a famous name, the new *Mauretania* will exceed her predecessor in tonnage by 3,000 tons, being registered as a 34,000-ton ship. She is 772 feet long, 89½ feet in beam and 112 feet, 2 inches from keel to the top of the superstructure. Boasting ten passenger decks, the *Mauretania*, together with the *Queen Elizabeth*, now under construction (see MI for December, 1938), and the *Queen Mary* will place England in the front rank in the race for world supremacy in the merchant marine field. The new vessel will be operated by the Cunard-White Star Line, plying between England and the United States.

## Voice Energizes New Short-Range Phone

A NEWLY developed short-range telephone uses no batteries or other outside source of energy other than the vibrations of the speaker's voice. The telephone has a special diaphragm which is connected to one end of an armature set between the poles of a powerful U-shaped permanent magnet. When sound waves strike the diaphragm the armature vibrates and varies the air-gaps between it and the pole-pieces of the magnet. This changes the reluctance of the magnetic circuit and induces voice-frequency currents in a coil which surrounds the armature, making clear-toned verbal messages possible.

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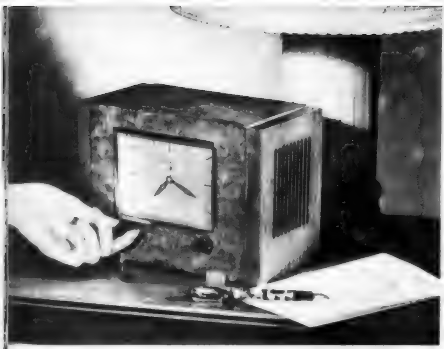
## Invents Saw To Make Hinged Wood Sandals

DESIGNED and perfected by himself, a wobbling gang saw with 13 off-center circular blades enables George Krasnosky, a Florida shoemaker, to produce hinged wooden sandals which are a great improvement over the regular non-flexible type worn by oystermen and bathing beach patrons. As shown in the photo, the wooden soles are held against the revolving circular saw blades which cut them into sections. Chrome-leather hinges are then used to hold the sections together, providing flexibility when worn for walking.

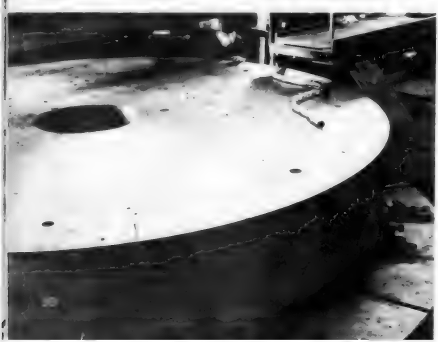


## Radio Clock-Receiver Tunes Automatically

COMPACT in size, a newly developed radio receiver resembles an electric clock in general appearance and can be set in advance, like an alarm clock, to turn on—hours later—any radio program selected. In addition to turning on any desired station at a pre-determined time, the clock-receiver may also be set to turn stations off automatically. The cabinet is modernistic in appearance, as shown in photograph.

## $40,000 Speedboat Undergoes Tests

RESEMBLING some sea monster risen from the depths, as it bobs around on the waves of Lake Windermere, England, prior to a test run, the speedboat shown at the left cost $40,000 to construct and will be piloted by Edward Spurr, an engineer, in an effort to better the present speed record of 130.86 m.p.h. held by Sir Malcolm Campbell. The pilot is protected from spray by a removable, transparent cowling which fits over the cockpit, located at the tail end of the craft.

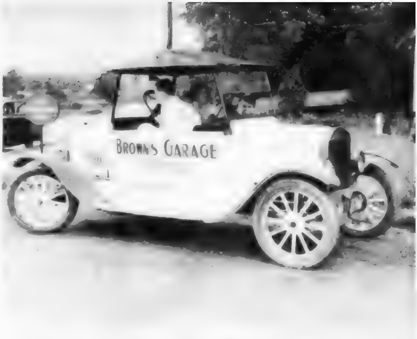


## Generator's Flywheel Weighs 95 Tons

DESIGNED by a well-known electrical supplies manufacturer for use on a 6,000 kilowatt motor-generator unit installed in a steel mill, the mammoth flywheel shown at left weighs 190,000 pounds. By means of its rotational energy, the giant flywheel will maintain the generator at a steady power output despite peaks and recessions in its load requirements as steel billets are pressed between the mill rolls.

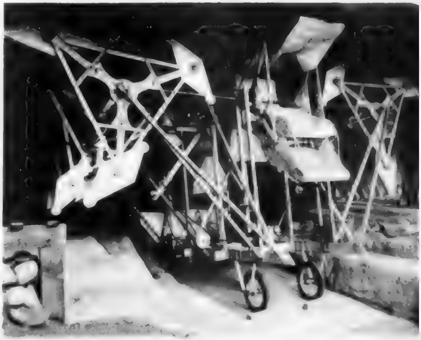
## Novel Automobile Is Advertising Medium

COMPOSED of two old Model T Ford auto bodies welded together on a single chassis so that it appears to have two front ends and no rear, a novel car constructed by a garage owner in Oteen, N. C., serves as an effective advertising medium. The actual rear wheels do not steer, the rear end being covered for appearance only. Because of its unusual appearance, the car is also in demand for parades.



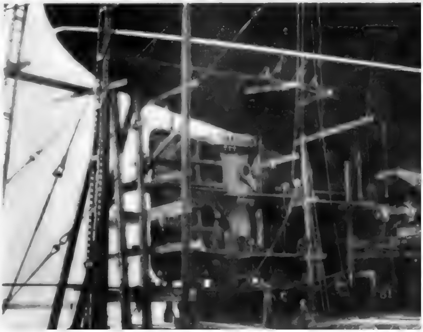
## Aerial "Dippers" Lift Wingless Aircraft

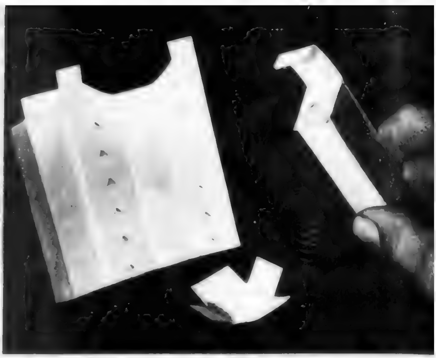
INVENTED and constructed by Henri Van Zandt and Louis Chequet in a secluded barn near Port Chester, N. Y., a new type of wingless flying machine is being readied for flight tests. Instead of the conventional wing, the machine has a series of rotatable blades which are designed to serve as aerial "dippers" to create the necessary lift. Air jaunts at altitudes of 10 to 100 feet will be possible with the machine, according to the inventors.



## World's Biggest Liner Fitted With Rudder

SCHEDULED for completion in 1940, the newly projected *Queen Elizabeth*, sister ship of the Cunard White Star Line's famous *Queen Mary*, was recently fitted with the huge rudder which will serve to steer her when she is placed in service between England and the United States as the world's largest ocean liner. In the right foreground of the photo can be seen a shaft to which will be fitted one of the 1,030-foot vessel's propellers.



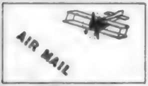


Above—The stamp hinge dispenser in use. Right—This shows the simple construction of the device.

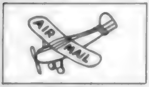
# Novel Stamp Hinge Dispenser Eliminates Waste

THIS novel stamp hinge dispenser holds a column of 1,000 hinges and permits their easy removal, one at a time, when needed. They are held, gum side up, in a cardboard container by pressure of a tiny spring. "V"-shaped lugs indented in the sides of the container engage a cardboard "follower" resting against the spring, thus maintaining necessary pressure. Only a portion of the top is open, and each time the finger is passed over the top, the finger tip removes a single hinge. When hinges no longer feed, pressure on the follower and spring brings another supply to the top. The new dispenser is claimed to be superior to the conventional types of boxes and envelopes used today for hinges, because waste is eliminated and greater convenience is offered the user. This dispenser can also be used successfully for gummed labels and other types of stickers.

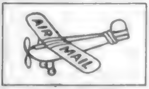
# Large Part Of World's Stamps Are Over-Printed



NEW GUINEA



PAPUA



PHILIPPINES

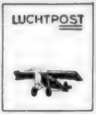
EVERY overprint seen upon a postage stamp is there for some very definite reason. Many are curious, some are unfamiliar to us. There are various groups of overprints, affording a wide field for the collector as well as the specialist.

The first airmail issues emanated from Italy as overprints on express stamps. In fact the first airmail issues of several other countries have been overprinted adhesives. Several of these have included in the overprint a sketch of a plane such as then in use. New Guinea (1931), Papua (1929), the Philippines (1933), the Dutch Indies (1928), are examples. Their first postal papers included, in the overprint, outlines of planes. In most instances the planes point to the left. Some are biplanes, such as on the New Guinea examples named; others are monoplanes.

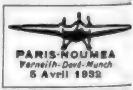
There have been a number of special flights which have been commemorated by over-

[*Continued on page* 122]

Note that most of the planes shown on this page point to the left.



DUTC
EAST
INDIE



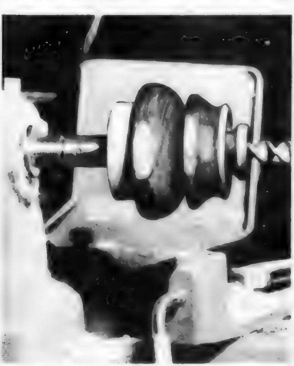
NEW CALEDONIA

# CRAFTS AND HOBBIES

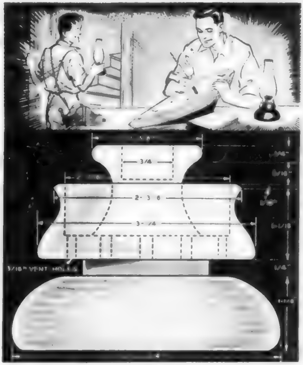
THIS attractive candle stick with standard chimney is made from a single piece of wood. Its over-all height is 3⅛ inches and its maximum diameter is 4 inches. The elaborate yet easy turning provides space for eight $\frac{3}{16}$-inch holes bored down through the top just under the lower edge of the glass chimney which provides a uniform and constant supply of air for the burning candle.

To prevent the need of leaving a hole made by the center screw of the face plate, glue a block of pine to the bottom and turn the screw into this. Roughly shape the block of walnut or other wood. Often the most striking effect is obtained from the wood if the grain is permitted to run with the lathe bed. Use the tail stock center as long as possible to prevent vibration. If the wood is not thoroughly kiln dried there will be a slight warpage after removing center wood. Therefore, keep the piece slightly oversize as long as possible. The hole for the candle should be bored last.

## VENTILATED CANDLE STICK

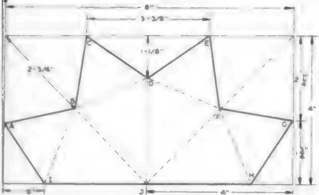


At right are shown the dimensions of this attractive candle stick holder. Above—The holder in the lathe. Top—The completed project with candle and chimney in place

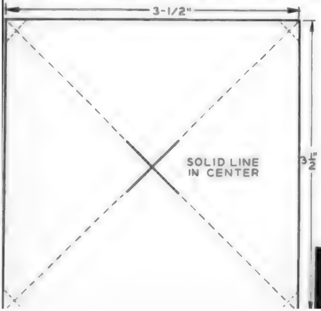


# MAKING OUTDOOR CHRISTMAS

by F. Leland Elam



Above. Design 1—A 4" by 9" rectangle is marked off as shown by the pattern. Folds are made along the lines IB, BD, DF, FH, JB, JD, and JF. Solder the sides IJ to JH after the folds, JB, JD, and JF have been made. Complete it by bending the points A, C. A and G together along the lines IB, BD, DF, and FH. If bright metal is used, as from a tin can, no additional finish is necessary, but if not, a coat of paint and an application of artificial snow will complete it.



DECORATING and lighting outdoor Christmas trees has become a part of our annual Yuletide festivities. To decorate such trees, dozens of small fixtures must be used. The ordinary glass fixture one buys at the store becomes a liability because of the large number which must be used and the ease with which they break. By clever use of paint and Christmas "snow," these metal decorations can be made to look attractive and give beauty to an outdoor tree both day and night. Likewise, the original cost will be less than that of fixtures bought at stores. They will last forever, for neither wind nor rain can damage them. They will not break, so there is no replacement cost.

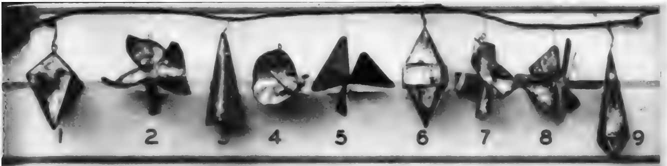
Decorations cut from tin can be easily bent and soldered into many different designs. The number of designs depends upon the ability and imagination of the person making them.

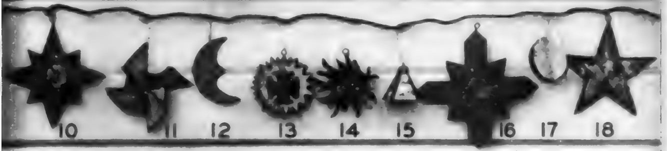
To hang metal decorations on trees, solder a piece of stiff wire to the fixture. Bend a ring in the protruding end. A piece of light wire fastened to the ring and a limb of the tree will hold them securely.

Before a decoration unit is cut out, a pattern should be drawn and cut so that the design can be transferred to a piece of tin. This

[*Continued on page* 123]

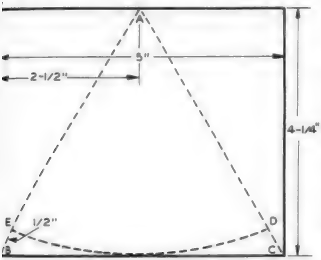
Left—A 3½" square is required for design 2. Draw diagonal lines from corner to corner. Measure ¼" from the ends of each line, and cut off each corner at this point. Cut along the lines to a point about a half inch from the center. Give one side of each triangle thus formed a quarter



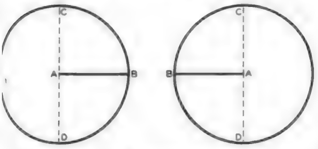


# TREE ORNAMENTS

Above—All of these ornaments can be made by following the directions given. The numbers correspond to the detailed drawings shown.



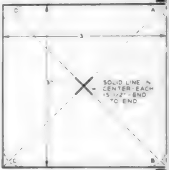
Above, Design 3—A piece of metal 5" by 4¼" is required for this ornament. With point A as the center, describe an arc having a 4¼" radius. Then draw the lines AB and AC. Cut out the portion ADE. When the edges AE and AD are soldered together, the resultant figure will be a cone.



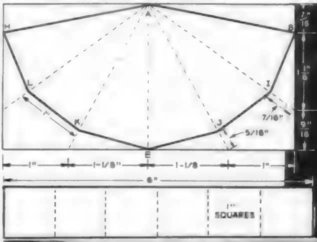
Above, Designs 4 and 17—Draw two circles on a piece of tin and cut them out. Make a cut in each piece from the edge to the center of the circle. Slide the two pieces together so that the cut portions overlap the uncut portions. A drop of solder at the center will hold them together. At this point, design 17 is completed. Design 4 is made in the same way with the addition of another step. After the two pieces are soldered together, bend each of the loose sides formed by the cuts, in opposite directions, as shown in the photograph.

Right—This shows how the two circles of metal are slid together for designs 4 and 17. The tops of old tin cans are satisfactory. If the tin is bright, no paint will be necessary.

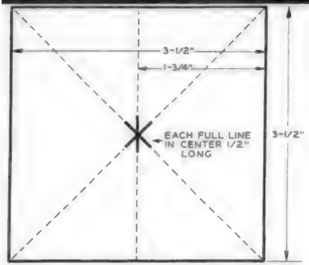
Right, Design 5—Draw diagonal lines from each corner of a three-inch square. Round off each corner as shown at A, B, C, and D. Cut along each diagonal line to a point one-quarter of an inch from the center. Twist each triangle section a half turn.



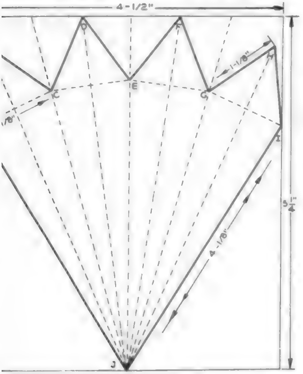
Below, Design 6—This ornament is made up of three individual parts. Two pyramids are made first. Draw the pattern shown below using the dimensions given. Bend along lines AL, AK, AE, AJ, and AI. Fasten the edges AH and AB together with solder. When both pyramids are completed, mark off a strip of metal six inches long and one-inch high into one-inch squares. Make a bend at the dividing line of each square. Then solder each of the pyramids to the hexagonal strip. A coat of paint completes the ornament.



corner. Then draw a line parallel to a side through the intersection of the diagonals. Cut along each line to a point one-quarter of an inch from the center. Roll each outside corner of each triangle around a pencil, one over and other under.

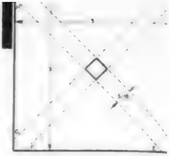


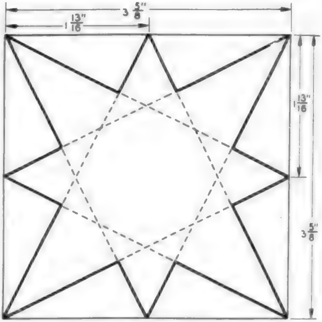
Below, Design 9—Folds should be made along the lines JC, JE, JG, AC, CE, EG and GI. The points B, D, F and H should meet. Solder along the lines AJ and JI, AB and HI, BC and CD, DE and EF, FG and GH. The sides AJ and JI should be fastened together before the sides of the smaller pyramid. Before attempting to fasten the smaller pyramid sides together, be sure that lines AB, BC, CD, DE, EF, FG, GH and HI are exactly same length.



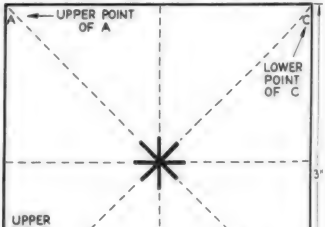
Design 12—The man in the moon is cut out free-hand from a circle three inches in diameter. Design 13—This is made from a 2½" diameter disc. A series of triangular cuts are made around the circumference. It is then given a coat of paint and an application of artificial snow. Design 14—A 2½" diameter disc is required. Make a series of circular cuts from the outer edge to a point a half inch from the center. Each piece made by the cuts is given a quarter-turn twist. Design 15 is made the same as Design 1, except that it is a single instead of a double pyramid. Design 16 is a flat piece of tin cut as shown in the photograph. Design 18 is conventional five-pointed star. Several sizes should be made.

Right, Design 8—A three-inch square is required. Measure a quarter of an inch from each corner. Connect these points by the lines AD, HE, BG, and FC. Where the two sets of parallel lines intersect, a square will be formed. Cut along each line as far as the square. Give each triangle a quarter-turn twist.



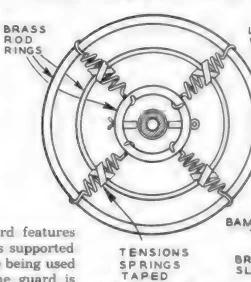


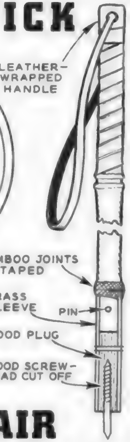
Above, Design 10—To make this eight-pointed star, a 3⅝-inch square is required. Mark the center of each edge. From these points draw lines to each diagonally opposite corner. The result will be an eight-pointed star. Any size piece of metal can be used, depending on the size of the star desired.



Above, Design 11—Draw diagonal lines from each corner. Then draw lines through the center from side to side to divide the square into quarters. Cut along each line to a point one-quarter of an inch from the center. Then bend the upper point of A, the lower point of C, the lower point of E and the upper point of G, until they touch the center of the figure.

# METAL SNOW RINGS FOR SKI STICK

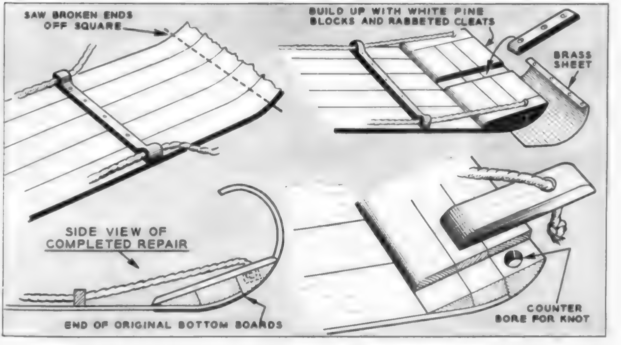

BRASS ROD RINGS
TENSIONS SPRINGS TAPED


LEATHER-WRAPPED HANDLE
BAMBOO JOINTS TAPED
BRASS SLEEVE
PIN
WOOD PLUG
WOOD SCREW-HEAD CUT OFF

THIS snow-ring ski-stick guard features three concentric rings of brass supported by four coil springs, adhesive tape being used to space the rings properly. The guard is fitted onto the bamboo ski-stick by means of a cotter pin which passes through a brass sleeve fitted over a wood plug and the ski-stick end, as shown in the sketches.

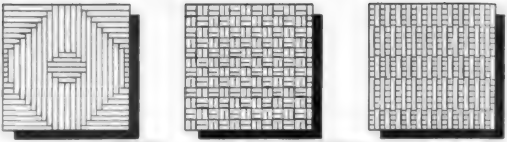
**Easily constructed after reading the text and studying the accompanying sketches, the home-built ski-stick and snow ring guard resembles a really professional job (photo).**

# A GOOD TOBOGGAN REPAIR


SAW BROKEN ENDS OFF SQUARE
BUILD UP WITH WHITE PINE BLOCKS AND RABBETED CLEATS
BRASS SHEET
SIDE VIEW OF COMPLETED REPAIR
END OF ORIGINAL BOTTOM BOARDS
COUNTER BORE FOR KNOT

DON'T throw your old toboggan away when it "cracks up." Saw off the broken ends square and as near the break as possible. Build up a new nose of lightweight cross members from white pine or redwood. Strengthen the entire structure with rabbeted cleats. Secure the pieces with countersunk brass screws through the bottom and treat all joints with waterproof glue. Complete the job by covering the nose with sheet brass.

Hickory splint weaving is commonly used for chairs having round rungs set into the legs. At right are some of the designs possible for this type of weaving.



# New Chair Seats

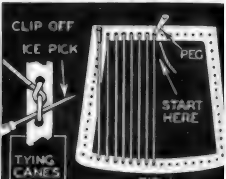


FIG. 1

An ice pick is very useful when weaving a cane seat. After several pieces of cane are passed through a hole, pick may be needed for opening it.

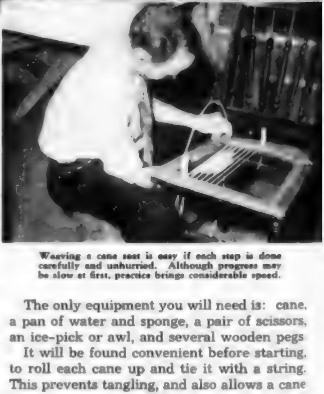
by Fred A. Beard

YOU can give your home-made projects that finished quality and just-right appearance by using different cane and fiber weavings for the seats and backs. The materials are available at upholstery shops, and the work is fascinating. Here are instructions for making three types of seats: caning, hickory splint weaving, and fiber roving.

CANING: The cane is derived from rattan, a product of the tropics, and is shiny on one side. It comes in four sizes—coarse, medium or common, fine, and fine-fine or superfine. The width used depends on the distance between the holes. If the holes in the seat are 15 to 17 per foot, use coarse; 19 to 21 holes per foot, use medium; 22 and over, use superfine. Cane is sold in bundles of about 1,000 feet—enough for three or four chairs. Wide cane for binding is sold by the foot.

Perhaps a chair lies discarded in your own attic, awaiting these instructions to restore it to usefulness; or you may wish to weave cane seats into benches, seats, chairs, etc., that you build yourself.

To drill the holes for caning, use a ¼ or $\frac{3}{16}$-inch drill, spacing the holes evenly and carefully.

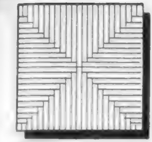


Weaving a cane seat is easy if each step is done carefully and unhurried. Although progress may be slow at first, practice brings considerable speed.

The only equipment you will need is: cane, a pan of water and sponge, a pair of scissors, an ice-pick or awl, and several wooden pegs

It will be found convenient before starting, to roll each cane up and tie it with a string. This prevents tangling, and also allows a cane to be dampening while work proceeds.

Dampen a piece of the cane with the sponge, or immerse it in water for 2 or 3 minutes, and insert the end of it downward through the center hole in the back of the seat, allowing it to project about three inches below. Stick a peg into the hole to hold



# For Old

This is an interesting and productive pastime.

FIG. 2

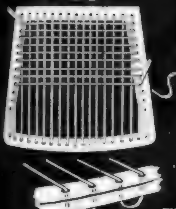
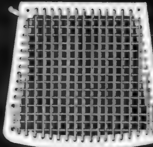


FIG. 3



If each step of this part of the weaving is started correctly, no difficulties should be encountered.

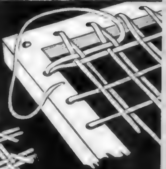


FIG. 4

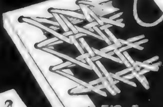


FIG. 5

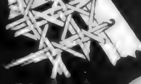
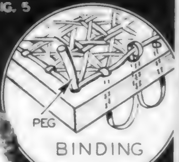


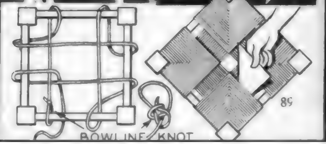
FIG. 6

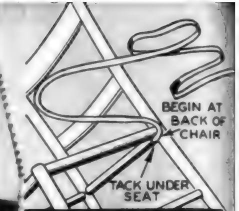


INSERT CARD-
BOARDS BEFO
COMPLETIN

Fiber roving is not difficult to do and makes an attractive seat for the chair or stool.

the cane in place, and draw the cane toward you. Thread it downward through the center hole in front, always keeping the shiny side up. Draw the cane upward through the next hole to the left at the front of the chair, across to the corresponding hole at the back of the seat, downward through that hole, and upward through the next hole beside it, and so on until you have reached the left-hand side. Peg the cane there and repeat for the right-hand half of the chair. This operation is illustrated in Fig. 1. Always keep the cane moist and untwisted, and keep the strands parallel, even if you have to skip holes to do it. Tie on additional pieces so that the splice




BEGIN AT BACK OF CHAIR
TACK UNDER SEAT

The first step in pith caning is taken by tacking one end to under part of the side rung close to the back of the chair.

always comes on the under side of the frame.

Now peg a piece of cane in a hole at about the mid-point on the left-hand side of the seat, or at the back left-hand side, and draw it to and down through the corresponding right-hand hole; then up through the next hole toward you, and back across, exactly as you did in Fig. 1. Keep all strands on top of those in the first operation, as shown in Fig. 2.

The next step is a repetition of the first step. Start at the same hole, proceed in exactly the same manner, and keep the strands all on top. This step is shown in Fig. 3.

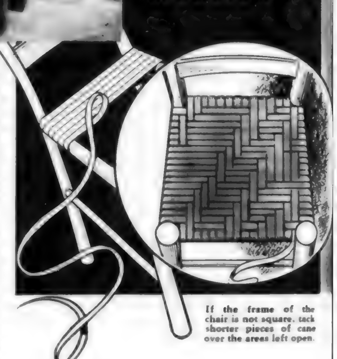
At this point the first real weaving begins. Start at the same hole where you began the second operation, (Fig. 2) and weave, under the bottom strands, over the top strands, pushing the top strands to the left as you work. Keep the strand you are weaving on the far (away from you) side of each previous lateral strand. This completed step is illustrated in Fig. 4.

Start the next step at the back left-hand corner hole. Weave the strand diagonally to the right, *over* the side-to-side strands, and *under* the front-to-back strands. This is important—it keeps the diagonal canes flat and free from buckling, by allowing them to slip between the right-angle crossings of the other strands, as seen in Fig. 5.

The last step in the weaving begins at the back right-hand corner, proceeding diagonally to the left, weaving *under* the side-to-side strands, *over* the front-to-back strands. See Fig. 6.

You are now ready to bind the edge. If the sides of the seat are curved, one piece of cane will go clear around it. If it has corners, it will require a piece for each side. The binding cane should, if possible, be considerably wider than that used in the weaving, but that is not essential. Peg a piece of the binding cane into any convenient corner hole, and lay it along the top of all the holes around the seat. Now, with another piece of cane, thread *up* through any hole, over the binding cane, and down through the same hole, up through the next hole, over and down, and so on, keeping the binding cane tight as you go. You will probably use the ice-pick considerably in binding, to open the holes which already have several canes passing through them.

After you have completed the binding, moisten the ends of any canes that are left extending below the frame, tie them securely, clip the loose ends, and remove the pegs that remain. The tying and peg-removing must be done as necessary during the weaving process.



If the frame of the chair is not square, tack shorter pieces of cane over the areas left open.

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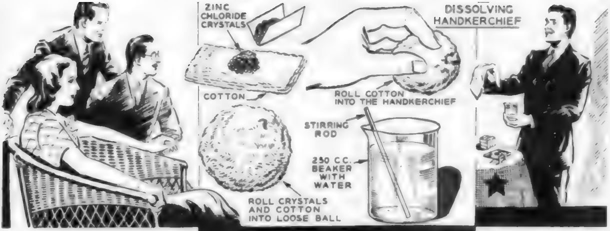
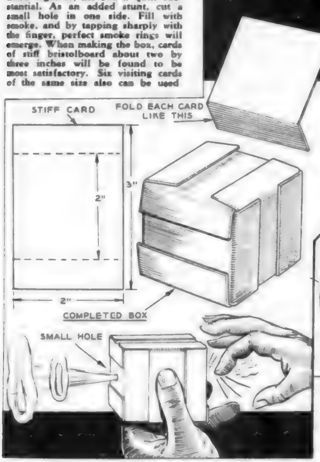
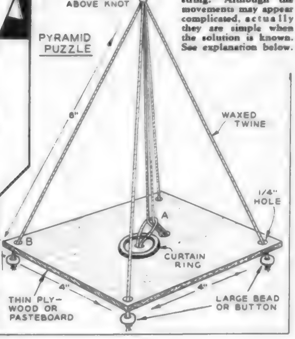

ZINC CHLORIDE CRYSTALS
DISSOLVING HANDKERCHIEF
COTTON
ROLL COTTON INTO THE HANDKERCHIEF
STIRRING ROD
250 C.C. BEAKER WITH WATER
ROLL CRYSTALS AND COTTON INTO LOOSE BALL

# AMUSING TRICKS

Below—This simple box can be made easily and quickly from six plain white cards. Fold them as shown below, being sure that the area between the folds is exactly square. When fitted together, the box is quite substantial. As an added stunt, cut a small hole in one side. Fill with smoke, and by tapping sharply with the finger, perfect smoke rings will emerge. When making the box, cards of stiff bristolboard about two by three inches will be found to be most satisfactory. Six visiting cards of the same size also can be used

Below—This pyramid puzzle is easy to set up and will furnish considerable amusement for small as well as large gatherings. The trick is to remove the ring attached to the loop, without untying or cutting any of the string. Although the movements may appear complicated, actually they are simple when the solution is known. See explanation below.


STIFF CARD
FOLD EACH CARD LIKE THIS
3"
2"
2"
COMPLETED BOX
SMALL HOLE


CUT OFF ABOVE KNOT
PYRAMID PUZZLE
8"
WAXED TWINE
1/4" HOLE
A
B
CURTAIN RING
4"
4"
THIN PLY-WOOD OR PASTEBOARD
LARGE BEAD OR BUTTON

A DISSOLVING HANDKERCHIEF—An ordinary cotton handkerchief is offered for examination and found to be unprepared. The magician shows a glass of water, drinks some of it to show that it also is unprepared, and drops the handkerchief into the remainder. In a few minutes, the handkerchief disappears. To do this trick, 10 grams of zinc chloride crystals are wrapped in a small piece of cotton. When the handkerchief is dropped in the water, the zinc chloride also is dropped in, without the audience seeing it. Zinc chloride will dissolve cotton, rayon, mixtures of both, and Cellophane. Care must be taken not to touch the zinc chloride because it is very caustic.

PYRAMID PUZZLE—The equipment for this puzzle consists of a piece of waxed string, a curtain ring and a piece of wood or heavy cardboard. To remove ring, pass loop A down corner hole B, over the small ring and up again. Do this at each corner. Pass the loop around the square and the ring is released.

# PLASTIC WOOD Inlaying

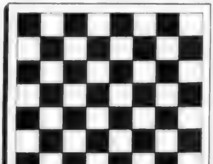
WOOD working fans will find an interesting and pleasant field of creative work opened to them by the use of Plastic Wood for inlaying purposes. Plastic Wood is a chemical composition that handles like putty and hardens into wood, and can be worked just like the natural product. Many attractive and useful objects can be made easily and cheaply with the help of this material. When mixed with the proper pigments, it takes on colors having an almost indefinite life.

The tools necessary for this work are as follows: an ordinary pocket knife, a straight razor with the blade ground to the shape shown in the drawing, a small platinum file shaped as shown, and a putty knife. High speed hand grinders and routers for fine work are a help but not a necessity. Oil colors of the popular shades should also be included if color work is to be done.

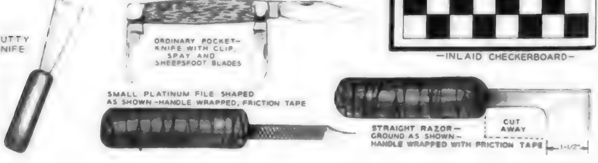
A checkerboard is probably one of the easiest projects for the beginner. First obtain a conventional wooden checkerboard having the squares painted. Make a cut about $\frac{1}{16}$-inch deep between all the squares. Then with a pocket knife, remove the dark squares to a depth of at least $\frac{1}{16}$-inch. When all the dark squares are removed, mix a small quantity of Plastic Wood with a dark oil color. Then fill in the squares to a level slightly above the light squares, allowing for shrinkage as it dries. Permit it to dry for about twenty-four hours and plane or sand the high spots down to the light squares.

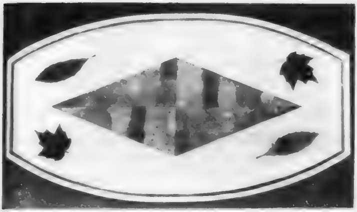
When completely smooth, again cut between the new squares and the light ones, using the razor blade. Be careful during this operation not to break into the plastic. Then remove the light sections and proceed exactly as for the dark squares, this time adding a light colored stain or none at all for natural

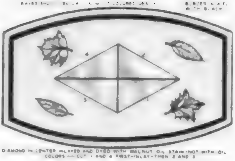
Below are shown the tools necessary for Plastic Wood inlaying. High-speed electric hand grinders and routers are also very useful but not absolutely necessary. Right — Inlaid checkerboard.



—INLAID CHECKERBOARD—


PUTTY KNIFE
ORDINARY POCKET-KNIFE WITH CLIP, SPAY AND SHEEPSFOOT BLADES
SMALL PLATINUM FILE SHAPED AS SHOWN—HANDLE WRAPPED, FRICTION TAPE
CUT AWAY
STRAIGHT RAZOR—GROUND AS SHOWN—HANDLE WRAPPED WITH FRICTION TAPE
1-1/2"

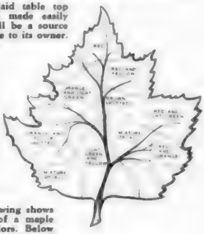



BLACK WITH BLACK
DIAMOND IN CENTER INLAYED AND DYED WITH WALNUT OIL STAIN—NOT WITH OIL COLORS — CUT 1 AND 4 FIRST—INLAY—THEN 2 AND 3

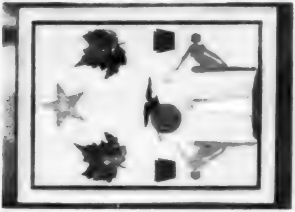
An inlaid table top can be made easily and will be a source of pride to its owner.

PLASTIC WOOD

Above, this photograph shows a diamond being cut in a piece of soft wood. Before attempting a large project, try a simple job. A little practice improves the larger work.


RED
RED AND YELLOW
ORANGE AND LIGHT GREEN
RED AND LIGHT GREEN
MIXTURE OF ALL
LIGHT GREEN AND YELLOW
RED AND ORANGE
MIXTURE OF ALL

Above—This drawing shows the color zones of a maple leaf in autumn colors. Below are shown examples of turned work and the method of building up the pieces.



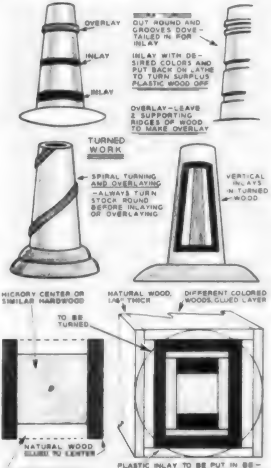
Above is shown a more elaborate example of Plastic Wood inlaying that can be done by the amateur. This type of work should be attempted only after considerable practice.

finish. When dry and smooth cover with varnish.

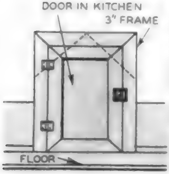
The maple leaf in autumn colors is a very attractive inlay project. Cut out the leaf in wood to a depth of about $\frac{1}{16}$-inch. Mix each color and fill in the various sections. Leave the lines between colors uneven. After it has dried for at least twenty-four hours, plane it level. Then with the platinum file, score out the lines representing the veins. Fill them with a mixture of vermilion and Plastic Wood. Sand off the surplus and varnish.

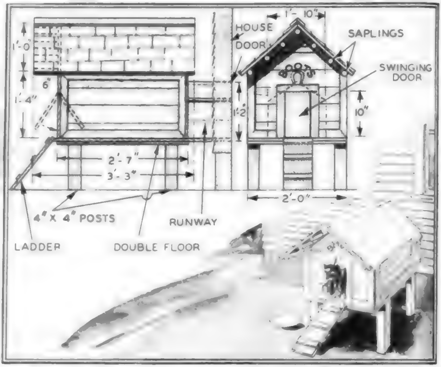
The table top shown in the photograph, although appearing to be an elaborate project, actually is not difficult. The diamond is dyed

[*Continued on page* 120]

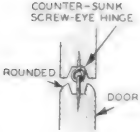

OVERLAY
INLAY
INLAY
CUT ROUND AND GROOVES DOVE-TAILED IN FOR INLAY
INLAY WITH DESIRED COLORS AND PUT BACK ON LATHE TO TURN SURPLUS PLASTIC WOOD OFF
OVERLAY—LEAVE 2 SUPPORTING RIDGES OF WOOD TO MAKE OVERLAY
TURNED WORK
SPIRAL TURNING AND OVERLAYING
—ALWAYS TURN STOCK ROUND BEFORE INLAYING OR OVERLAYING
VERTICAL INLAYS IN TURNED WOOD
HICKORY CENTER OR SIMILAR HARDWOOD
NATURAL WOOD, 1/8" THICK
DIFFERENT COLORED WOODS, GLUED LAYER
TO BE TURNED
NATURAL WOOD GLUED TO CENTER
PLASTIC INLAY, NEXT
PLASTIC INLAY TO BE PUT IN BETWEEN LAYERS OF NATURAL WOOD—IN OPPOSITE LAYERS

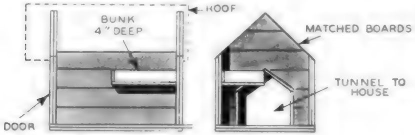
# A Bunk-House For Dogs

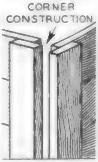

DOOR IN KITCHEN
3" FRAME
FLOOR


1'-10"
HOUSE DOOR
SAPLINGS
SWINGING DOOR
1'-0"
6"
1'-4"
1'-2"
10"
2'-7"
3'-3"
2'-0"
4" X 4" POSTS
RUNWAY
LADDER
DOUBLE FLOOR

The dimensions shown in the drawings are for a small dog. The size of the house can be increased to accommodate a larger animal.

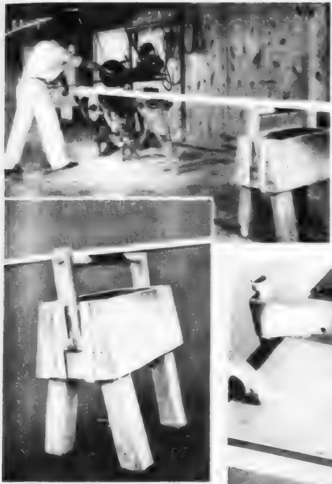

COUNTER-SUNK SCREW-EYE HINGE
ROUNDED
DOOR


ROOF
BUNK 4" DEEP
DOOR
MATCHED BOARDS
TUNNEL TO HOUSE


CORNER CONSTRUCTION

THIS picturesque kennel has a sturdy little bunk attached to the wall, and can be made with or without the connecting tunnel which leads into the kitchen through the wall. The dimensions shown are for a Boston terrier or small pup, and can be enlarged or doubled for a larger dog. Use matched boards for the floor, ends and sides. Note the corner construction of the frame of one-by-four boards, the edges set about 1 inch beyond the ends of the matched boards, so that the adjoining frames will fit snugly together. The upper edges of the sides are beveled to fit the roof boards. Make a door in the front, fastening a frame around the opening as shown. The snug-fitting door is rounded at the top, and counter-sunk screw eyes are fastened in the rounded edge and upper edge of the frame so that the door will swing easily either way. The bunk box is about 4 inches deep and filled with straw and a warm blanket. It is nailed in one corner as shown, not too far from the floor so that the dog can get into it easily. Double plank the floor bottom, to give double protection from weather, and set the kennel on four-by-four posts set in the ground. The roof consists of matched boards, overhanging the ends and sides about 2 inches, and projecting 6 to 9 inches beyond the front end. Cut sections of sapling and nail them under the projecting eaves, to give the bunk house a little "color." Narrow cleats nailed to a wide board, and fastened to the front of the floor will provide a convenient ladder. Use cedar shingles or some made from scraps of old linoleum, topped with a ridge pole

[*Continued on page* 126]

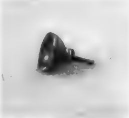


## An Adjustable Saw Horse

AN ADJUSTABLE saw horse will have many uses in the shop, and particularly with a cut-off saw having an adjustable table. The slotted sides slide up and down over a half-inch bolt. Wing nuts should be used on each bolt. The roller can be a pipe of almost any convenient diameter, on a quarter-inch or larger rod. The extension sides should be long enough so that when extended as far as possible, the top of the roller will be at least as high as the top position of the saw table.

## Old Oil Can Becomes Efficient Funnel

EXCELLENT small-neck funnels can be made from discarded oil cans. To change an oil can into a funnel, cut out the bottom, and smooth the edge.

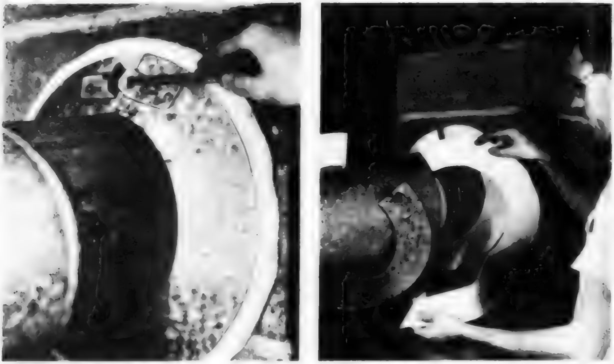


## Plywood Aids Power Saw

WHEN cutting very thin strips on a circular saw, a piece of quarter-inch plywood clamped to the table will improve the work. The saw should be raised to the height of the piece to be cut, thus making a slot in the plywood that is no larger than necessary.

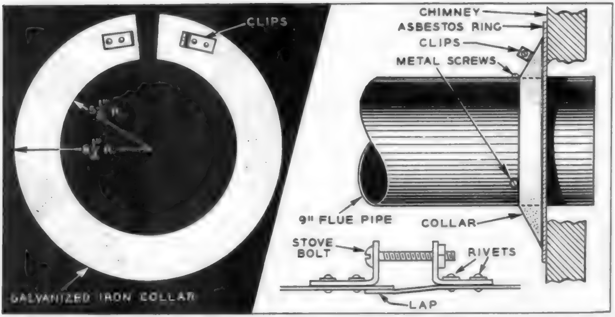
## Old Sewing Machine Spins Emery Wheel

A HANDY emery wheel can be set up by using a discarded sewing machine. The section of the machine head containing the plunger and other needle driving parts is cut off and a face plate fastened over the opening. The rotary shaft should be left in place so that it extends through face plate with room for the emery wheel.



# CHIMNEY COLLAR REQUIRES NO CEMENT

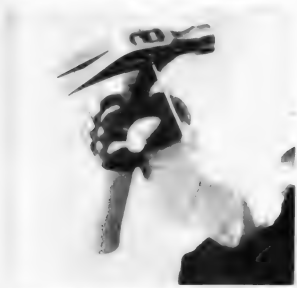
Left—When completed, this collar is not only efficient but has a neat appearance. Above—Several layers of asbestos are placed before the metal collar is fastened around the pipe.


CLIPS
GALVANIZED IRON COLLAR
CHIMNEY
ASBESTOS RING
CLIPS
METAL SCREWS
9" FLUE PIPE
COLLAR
STOVE BOLT
RIVETS
LAP

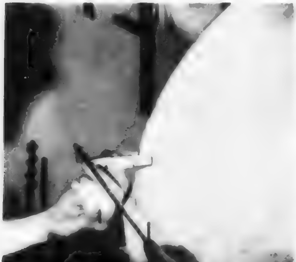
The outside diameter of the collar is 17 inches while the inside diameter is 11 inches. Three round head metal screws are inserted in the pipe just behind the collar to hold it in place.

THIS easily made chimney collar consists of a metal ring 17" in diameter outside and 11" inside diameter with two small angles riveted to the ring and spaced about 1½" apart. With these in place cut a narrow "V" out of the ring close to one of the angles. Cut two rings from asbestos fabric slightly larger in outside diameter than the metal ring and the same diameter as the flue pipe. Place these around the pipe and then add the metal collar in similar fashion and insert a stove bolt in the angles.

## Clip Speeds Difficult Work

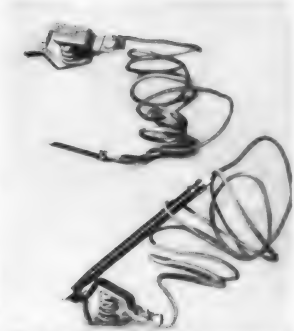


THIS nail clip which can be attached easily to any hammer, holds the nail firmly while starting it in sheet metal or wood. The clip is screwed to the handle and when in place does not interfere with use of the hammer for ordinary work.



## Clothes Pin Supports Saw

AN ORDINARY clothes pin will support the frame of a hand jig saw when moving a large piece of work in a vise. Many blades have been broken because of the lack of some means of supporting the saw when the position of the work is changed in the vise.



## Pencil Becomes Arc Welder

WHEN soldering very small jobs, an ordinary mechanical pencil offers a convenient means of producing a tiny carbon arc. One terminal of a storage battery is connected to the pencil and the other is connected to the wire solder to be used.

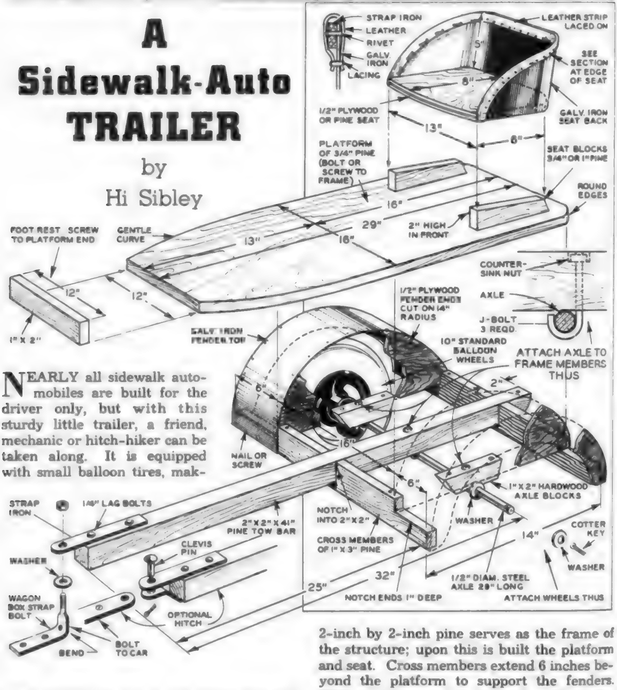
## Tall Bottle Holds Paint Brush

THE tall glass bottles in which olives are sold are ideal for supporting paint brushes when they are not in use. A minimum of linseed oil or turpentine is placed in the bottle, and the brush is hung by means of a nail through the handle.

# A Sidewalk-Auto TRAILER

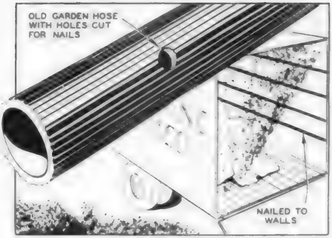
by
Hi Sibley

NEARLY all sidewalk automobiles are built for the driver only, but with this sturdy little trailer, a friend, mechanic or hitch-hiker can be taken along. It is equipped with small balloon tires, making it possible to tow at full speed and with comfort for the passenger. The towbar of 2-inch by 2-inch pine serves as the frame of the structure; upon this is built the platform and seat. Cross members extend 6 inches beyond the platform to support the fenders. With the exception of axle and seatback the trailer is made entirely of wood.


STRAP IRON
LEATHER
RIVET
GALV. IRON
LACING
LEATHER STRIP LACED ON
5"
8"
SEE SECTION AT EDGE OF SEAT
1/2" PLYWOOD OR PINE SEAT
GALV. IRON SEAT BACK
13"
8"
PLATFORM OF 3/4" PINE (BOLT OR SCREW TO FRAME)
SEAT BLOCKS 3/4" OR 1" PINE
ROUND EDGES
16"
29"
2" HIGH IN FRONT
FOOT REST SCREW TO PLATFORM END
GENTLE CURVE
13"
16"
12"
12"
1" X 2"
COUNTER-SINK NUT
AXLE
J-BOLT 3 REQD.
ATTACH AXLE TO FRAME MEMBERS THUS
1/2" PLYWOOD FENDER ENDS CUT ON 14" RADIUS
GALV. IRON FENDER TOP
10" STANDARD BALLOON WHEELS
2"
6"
16"
NAIL OR SCREW
6"
1" X 2" HARDWOOD AXLE BLOCKS
STRAP IRON
1/4" LAG BOLTS
2" X 2" X 41" PINE TOW BAR
NOTCH INTO 2" X 2"
WASHER
COTTER KEY
14"
CROSS MEMBERS OF 1" X 3" PINE
CLEVIS PIN
WASHER
WASHER
32"
1/2" DIAM. STEEL AXLE 29" LONG
25"
NOTCH ENDS 1" DEEP
ATTACH WHEELS THUS
WAGON BOX STRAP BOLT
OPTIONAL HITCH
BEND
BOLT TO CAR

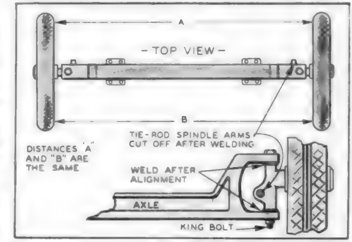
## Rubber Hose Protects Furniture In Truck

IN MANY trucks or vans, it is difficult to prevent the sides from scratching or marring the objects being carried. This problem can be eliminated by fastening several lengths of old rubber hose to the sides as shown by the drawing at the right. Cut a hole in the side of the hose at each point where a nail is to be used to hold it in place. The nails then are behind the outer side of hose.


OLD GARDEN HOSE WITH HOLES CUT FOR NAILS
NAILED TO WALLS

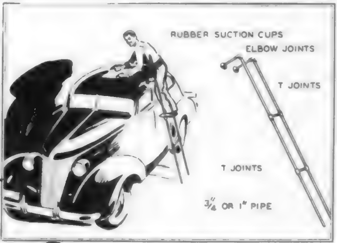
## Welds Make Old Front Axle Useful For Trailer

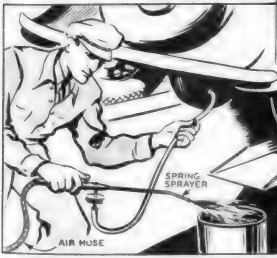
AN OLD front axle will be entirely suitable for use on a trailer if it is prepared as shown in the drawing. The spindles and axle should be welded so that when finished they are one solid unit. To set it up for welding, the wheels and tires should be in place, so that the distance A and B can be made equal. The king bolts then should be drawn up so that they are tight.


A
- TOP VIEW -
B
TIE-ROD SPINDLE ARMS CUT OFF AFTER WELDING
DISTANCES "A" AND "B" ARE THE SAME
WELD AFTER ALIGNMENT
AXLE
KING BOLT

## Pipe Ladder Simplifies Washing Top Of Car

THIS pipe ladder suitable for washing or polishing the top of a car, can be made easily and quickly with some short lengths of pipe, some "T" and elbow joints, and two rubber suction cups. The cups will prevent the ladder from slipping when in use.


RUBBER SUCTION CUPS
ELBOW JOINTS
T JOINTS
T JOINTS
3/4 OR 1" PIPE


SPRING SPRAYER
AIR HOSE

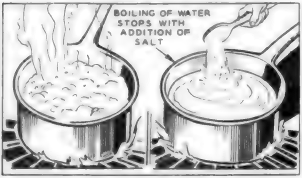
## Spring Sprayer Becomes Differential Flusher

AN ORDINARY spring sprayer can be used to remove the gear oil from the differential. Remove the can on the sprayer used to hold the penetrating oil. Connect a hose from this point and insert the other end in the differential case. Turn on full pressure and the oil will be sucked out of the case.

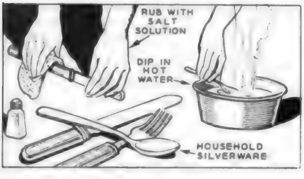
# HOME SCIENCE

SALT has been popularly used in the home since the dawn of civilization. As far back as 2,700 B.C., one finds it pictured in the oldest Chinese treatise which dealt with ancient medicines. To this day, the Chinese throw salt on a fire as a part of their New Year ceremonial, for the manner of its burning is taken as an indication of the future welfare of the people. The ancient Greeks regarded the mineral substance with especial significance, and the Romans worshipped it to such an extent that if it were accidentally spilt it was an ill omen. The Russians sprinkled it into the coffin of their dead, while others used it in their baptismal ceremonies. In olden France, salt was held in such high esteem that the penalty for its illegal manufacture meant torture by the "rack and candle," which consisted of stretching and burning the victim. Hanging was the penalty for a second offender. In Africa one finds that the black slaves were sold for a "brick of salt"—so highly was it prized.

## Raising Water's Boiling Point


BOILING OF WATER STOPS WITH ADDITION OF SALT

Into a small pan of boiling water place a few teaspoonsful of salt. The violent boiling immediately stops. This is caused by the increased boiling point of the salt water solution. It will take several minutes to bring the solution to a boil again. If salt is added a second time, the solution will again stop boiling until the salt water reaches a new boiling point.

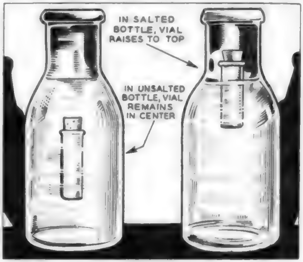

RUB WITH SALT SOLUTION
DIP IN HOT WATER
HOUSEHOLD SILVERWARE

## Tarnish Remover

Rub some moistened table salt on the surface of a piece of tarnished silver. Then rinse in warm soapy water. It will be found that the original appearance of the silver has been restored. This method will be found useful for removing the dark-colored stains on silver spoons caused by eggs.

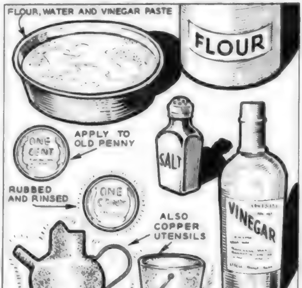
## Salt Adds Buoyancy To Fresh Water

In a milk bottle of water place a small vial, balanced so that it neither floats nor sinks. This balance can be obtained by adding or removing small quantities of water until it remains wherever it is placed in the water. Then add about three tablespoonsful of salt to the water in the milk bottle. It will be found that the vial, which previously had been "balanced," now will immediately rise to the surface of the water. This demonstrates how the human body is buoyed up more when swimming in salt water than in fresh water.


IN SALTED BOTTLE, VIAL RAISES TO TOP
IN UNSALTED BOTTLE, VIAL REMAINS IN CENTER

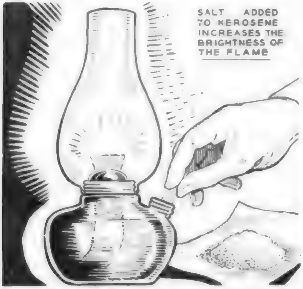
## Polishing Pennies

In a small saucer or pan, mix equal quantities of salt and flour. Add vinegar until a thick paste is formed. Apply this paste to a dull-appearing penny. Permit it to stand for about an hour and then rub off the paste and rinse in water. When polished with a soft dry cloth, the surface of the penny will become as bright as when it was new. This paste will be very satisfactory for cleaning all types of old pieces of copper.


FLOUR, WATER AND VINEGAR PASTE
FLOUR
APPLY TO OLD PENNY
ONE CENT
SALT
RUBBED AND RINSED
ONE CENT
ALSO COPPER UTENSILS
VINEGAR

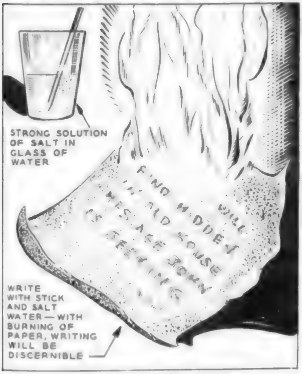
# EXPERIMENTS WITH SALT

by Prof. Victor Lewitus


SALT ADDED TO KEROSENE INCREASES THE BRIGHTNESS OF THE FLAME

## Sunlight From Kerosene

Into the reservoir of a kerosene lamp, place a pinch or two of table salt. When the lamp is lighted, it will be found that the brilliance of the flame has been materially increased. This is caused by the fact that the salt contains sodium.

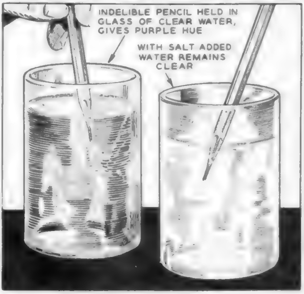

STRONG SOLUTION OF SALT IN GLASS OF WATER
FIND HIDDEN WILL
IN OLD HOUSE
MESSAGE JOHN
IS SEEKING
WRITE WITH STICK AND SALT WATER—WITH BURNING OF PAPER, WRITING WILL BE DISCERNIBLE

## Salty Spy's Ink

To a half-glass of water, add two teaspoonsful of salt. Stir until completely dissolved. Using a toothpick or other small piece of wood, write with this solution on a piece of plain white or yellow paper. When dry, the writing will be found to be invisible. Touch a lighted match to the paper and as it burns, the writing will become visible in an accentuated black on the charred paper. Do not move paper as it burns.

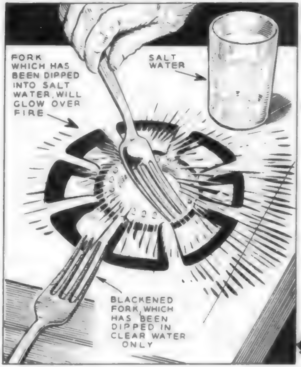
## Indelible Pencil Stunt

Hold an indelible pencil point down, in a glass of water. Note that the pencil quickly gives the water a strong purple hue. In another glass of water to which several teaspoonsful of salt has been added, hold the pencil in it as before. This time as fast as the color is formed, it is bleached out.


INDELIBLE PENCIL HELD IN GLASS OF CLEAR WATER, GIVES PURPLE HUE
WITH SALT ADDED WATER REMAINS CLEAR

## The Mystical Fork

Dip an iron fork into plain water and hold it over an open flame. In a short time the fork will glow red. Remove the fork from the flame and dip it into a strong solution of salt and water. Hold it over the flame again and this time instead of becoming red, it will give off a bright yellow glow. This is caused by the element sodium in the salt. The stronger the salt solution, the more apparent will be the yellow glow when fork is heated. This can also be done with other metals.


FORK WHICH HAS BEEN DIPPED INTO SALT WATER, WILL GLOW OVER FIRE
SALT WATER
BLACKENED FORK, WHICH HAS BEEN DIPPED IN CLEAR WATER ONLY

# Study Blood

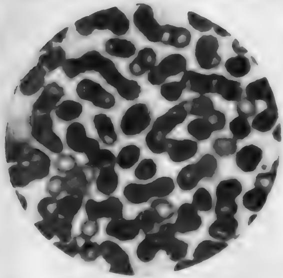
To obtain a drop of blood for microscopic examination, puncture the base of the thumb as shown in the photograph. Be sure the needle to be used is sterile, and the hands have been washed thoroughly

FEW indeed among the almost innumerable subjects for study beneath the microscope have so wide an appeal as blood. Through detailed knowledge of this vital fluid the physician diagnoses many of our serious diseases, prepares serums for prevention or cure and performs transfusions. The criminologist unravels homicide cases; the bacteriologist and parasitologist study many dangerous foreign invaders of our bodies. The student of histology, genetics, evolution and dozens of other sciences find it a source of never-ending interest and continually add to our information. If you have a microscope magnifying three hundred or more diameters this chapter should prove as fascinating as any yet touched upon in the series.

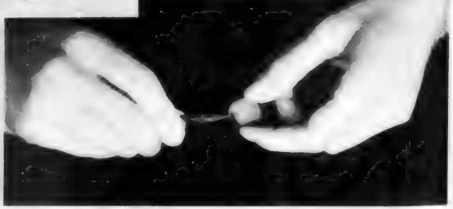
Blood is the only general tissue of the body that can be examined microscopically without killing the subject and preparing stained sections. A slight and superficial puncture, and the entire panorama of this complex substance is spread before you for inspection. Two types of slides will be described first, the fresh blood smear, and that which is fixed and stained for permanent mounting.

Various portions of the body have been recommended as a source from which to obtain a blood sample, chiefly the thumb and lobe of the ear. Instruments for the purpose include a needle, a small and sharp knife called a blood lancet, or one with a spring-actuated plunger. Suppose we try a medium-coarse needle on the thumb.

*Precautions against infection must be carefully observed.* Wash the left thumb well with soap and water, then wipe the back of



Above—A prepared slide of human blood to which Wright's stain has been applied. The object in the center is a polymorphonuclear leucocyte. Others around it are red corpuscles.



Right — Making a blood film between two cover glasses which are then rapidly drawn apart.

# With a Microscope

### by Julian D. Corrington, Ph.D.

this digit with alcohol. Pass the needle through alcohol or a flame to sterilize it. As soon as the blood sample has been obtained apply tincture of iodine to the puncture.

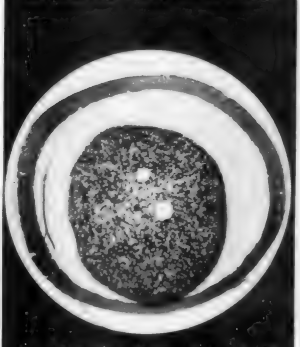
Begin by swinging the left arm vigorously several times to drive blood into the fingers, then wrap a handkerchief or strip of gauze spirally around the left thumb, beginning at the base and tightening as you go. Prick the thumb on the back or upper surface, a short distance in rear of the nail, causing a drop of blood to appear. Apply immediately to the center of a slide, add the cover and seal around the edges with vaseline, olive oil or any fairly heavy mineral oil. Speed of manipulation is important to prevent clotting.

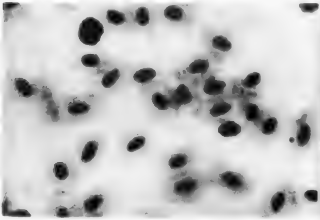
[*Continued on page* 125]

This is the fourteenth in a series of articles published by **MECHANIX ILLUSTRATED** on the fascinating subject of microscopy. Previous articles are as follows:

December 1938—Minerals Make Colorful Mounts For The Microscope.
November—Unravel Secrets of Bee Life With Microscope.
October—Make Diatom Slides For Your Microscope.
July—Staining Slides For Your Microscope.
June—Chemistry of Microscope Slides.
May—How To Cut Sections For Your Microscope.
April—Documentary Evidence.
March—The Silent Sherlock.
February—Finger Prints In Fur.
December 1937—Hitching A Microscope To Your Camera.
November—The Autumn Empire Of Insects.
October—Microscope Reveals Mysteries Of Life In Water.
September—Visit New Worlds With A Home Microscope.

This photograph shows a slide of barium crystals being studied under a modern laboratory microscope.





Above—A low-power photomicrograph of a cross section of a leg bone. Left—A slide of frog blood. Compare with the photograph of human blood and note important differences: in the frog blood, the red cells are large, nucleated and oval.

# The Hi-Fi Receiver

This set gives listeners the best in quality reception.

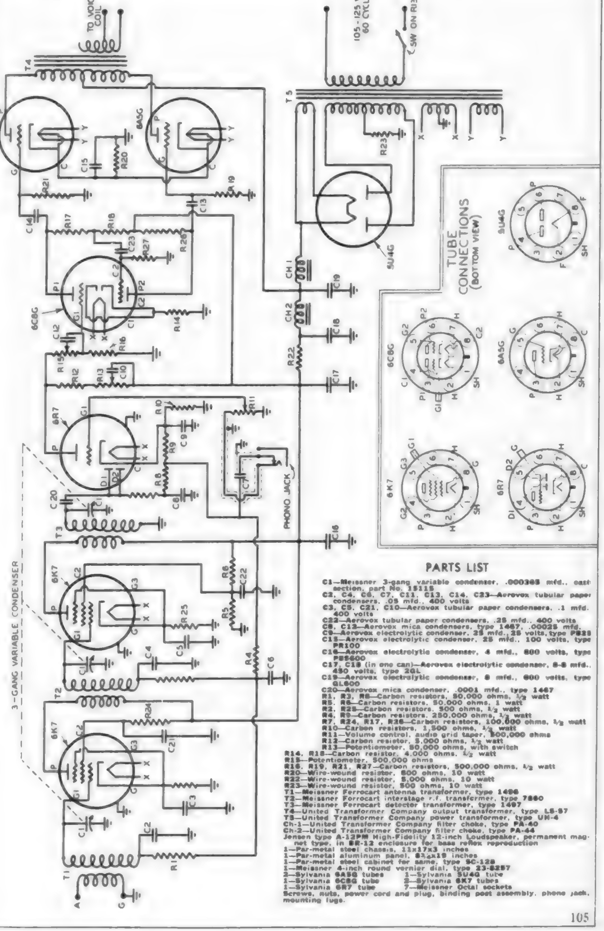
by
John H. Potts

This photograph shows the completed receiver in operation. The receiver itself is contained in the metal cabinet on the speaker. Although a steel panel can be used, one of aluminum will be much easier to drill.

FOR most of us the maximum in radio enjoyment is reached when we listen to a really fine musical program, broadcast from a high-fidelity local station and picked up by a receiver of outstanding excellence. For such reception, we need a receiver fairly broad in tuning, of only moderate sensitivity, with an audio amplifier of extraordinary fidelity to feed a reproducing system of equally high grade. The receiver to be described is designed to meet just such requirements. Though only seven tubes are employed, every essential feature for high-fidelity reception is included. A simple two-stage tuned r.f. amplifier with high-grade iron-core r.f. transformers provides all needed gain without the undesirable sharpness of tuning which characterizes ordinary superhets. The diode rectifier furnishes detection and automatic volume control, which prevents blasting and reduces the sensitivity to weak, distant stations when the desired local is tuned in. This aids in eliminating interference without making the tuning sharp.

The audio system is absolutely "top notch." The low-gain triode section of the 6R7 duo-diode triode incorporates a means for boosting bass notes. This first audio stage is coupled to a moderately high-gain double-triode 6C8G which acts as a phase inverter to feed the high-power push-pull 6A5G output triodes. In the grid circuit of this phase inverter an adjustable treble control is included. The high-fidelity speaker is mounted in a bass-reflex cabinet and is fed by a laboratory-standard output transformer. The whole outfit is simple to build and is not expensive when one considers the results secured as compared with commercial receivers of the highest grade.

The schematic diagram is shown on page 105. The antenna transformer, T1, has a high-impedance primary and is designed for use with a long antenna. The secondary is tuned by C1, each section of which has a maximum capacity of .000365 mfd., to cover the broadcast range from 1,700 kc to 550 kc The 6K7 first r.f. tube receives its screen

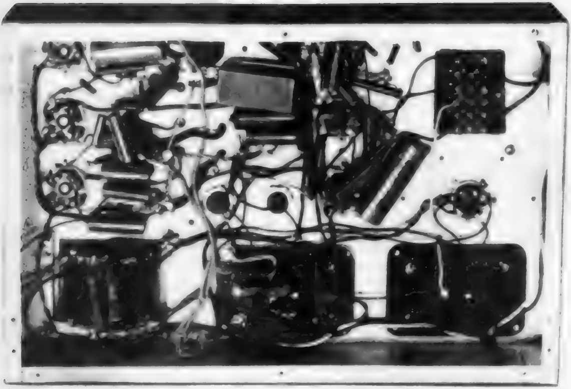

TO VOICE COIL
T4
6A5G
6A5G
P
G
C
Y Y
C15
R20
R21
R19
C13
C14
R17
R18
C23
R27
R26
6C8G
P1
P2
C2
G1
C1
R14
C12
R16
R15
R12
R13
C10
6R7
G1
D1
D2
R10
R11
C9
R9
R8
C8
C7
PHONO JACK
C20
T3
C16
6K7
G3
R6
C22
R5
R25
C5
C4
R4
C6
T2
R24
C21
C3
C2
R1
T1
A
G
3-GANG VARIABLE CONDENSER
105 - 125 V 60 CYCLE
SW ON R13
T5
X X
Y Y
R23
5U4G
CH1
C19
CH2
C18
R22
C17
TUBE CONNECTIONS (BOTTOM VIEW)
5U4G
6C8G
6A5G
6K7
6R7
P
F
SH
H
G
C
G2
G3
C1
C2
P1
P2
G1
D1
D2

## PARTS LIST

C1—Meissner 3-gang variable condenser, .000365 mfd., each section, part No. 15115
C2, C4, C6, C7, C11, C13, C14, C23—Aerovox tubular paper condensers, .05 mfd., 400 volts
C3, C5, C21, C10—Aerovox tubular paper condensers, .1 mfd. 400 volts
C22—Aerovox tubular paper condensers, .25 mfd., 400 volts
C8, C12—Aerovox mica condensers, type 1467, .00025 mfd.
C9—Aerovox electrolytic condenser, 25 mfd., 25 volts, type PB25
C15—Aerovox electrolytic condenser, 25 mfd., 100 volts, type PR100
C16—Aerovox electrolytic condenser, 4 mfd., 600 volts, type PBS600
C17, C18 (in one can)—Aerovox electrolytic condenser, 8-8 mfd., 450 volts, type 2GL
C19—Aerovox electrolytic condenser, 8 mfd., 600 volts, type GL600
C20—Aerovox mica condenser, .0001 mfd., type 1467
R1, R3, R8—Carbon resistors, 50,000 ohms, ½ watt
R5, R6—Carbon resistors, 50,000 ohms, 1 watt
R2, R25—Carbon resistors, 500 ohms, ½ watt
R4, R9—Carbon resistors, 250,000 ohms, ½ watt
R7, R24, R17, R26—Carbon resistors, 100,000 ohms, ½ watt
R10—Carbon resistors, 1,500 ohms, ½ watt
R11—Volume control, audio grid taper, 500,000 ohms
R12—Carbon resistor, 5,000 ohms, ½ watt
R13—Potentiometer, 50,000 ohms, with switch
R14, R18—Carbon resistor, 4,000 ohms, ½ watt
R15—Potentiometer, 500,000 ohms
R16, R19, R21, R27—Carbon resistors, 500,000 ohms, ½ watt
R20—Wire-wound resistor, 800 ohms, 10 watt
R22—Wire-wound resistor, 5,000 ohms, 10 watt
R23—Wire-wound resistor, 500 ohms, 10 watt
T1—Meissner Ferrocart antenna transformer, type 1496
T2—Meissner Ferrocart interstage r.f. transformer, type 7860
T3—Meissner Ferrocart detector transformer, type 1497
T4—United Transformer Company output transformer, type LS-57
T5—United Transformer Company power transformer, type UH-4
Ch-1—United Transformer Company filter choke, type PA-40
Ch-2—United Transformer Company filter choke, type PA-44
Jensen type A-12PM High-Fidelity 12-inch Loudspeaker, permanent magnet type, in BR-12 enclosure for bass reflex reproduction
1—Par-metal steel chassis, 11x17x3 inches
1—Par-metal aluminum panel, 8¾x19 inches
1—Par-metal steel cabinet for same, type SC-128
1—Meissner 4-inch round vernier dial, type 23-8257

| | |
|---|---|
| 2—Sylvania 6A5G tubes | 1—Sylvania 5U4G tube |
| 1—Sylvania 6C8G tube | 2—Sylvania 6K7 tubes |
| 1—Sylvania 6R7 tube | 7—Meissner Octal sockets |

Screws, nuts, power cord and plug, binding post assembly, phone jack, mounting lugs.



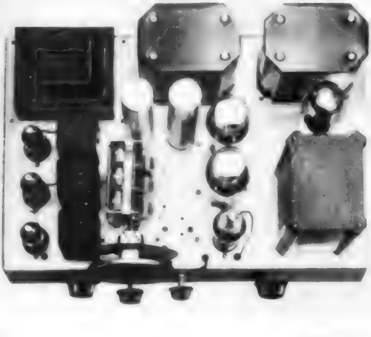
This under-side view of the chassis shows the position of all parts. This layout should be followed as closely as possible for the best results. The power transformer is placed at the lower left.

voltage through R24 while the second 6K7 derives its screen voltage from the voltage divider formed by R5 and R6. This arrangement gives excellent decoupling for the two tubes so there is no interaction between them. T3 feeds the diode section of the 6R7. Both diodes are connected together and coupled to the transformer, T3, through the blocking condenser, C20.

The audio voltage is picked up by the grid of the triode section of the 6R7 at the junction of R8 and R9 through the blocking condenser, C7, which connects through the phono jack to the high side of the volume control, R11. The lead from C7 to the jack and from the jack to the volume control must be shielded or some hum pickup will result. The shielding is grounded to the chassis.

The bass note booster is located in the plate circuit of the 6R7 and is formed by R13, 40,000-ohm potentiometer, and C10, a .1 mfd. condenser. When the moving arm of R13 shunts C10 across the entire 40,000 ohms the tube gain for high frequencies is about 5, while at 200 cycles the gain is

[*Continued on page* 121]



This photograph shows the top-of-the-chassis arrangement of parts. The rectifier tube is at the extreme right. The r. f. portion of receiver is at the left side near the power transformer.

# MECHANIX ILLUSTRATED PHOTOGRAPHY

## SECTION

PAGES 107-116

FIRST PRIZE: "You Scratch Me" by Rudolph Boger, Brooklyn, N. Y. Super Ikonta B at f.16 and 1/100 sec. with light yellow filter. SECOND PRIZE: "Witch Tree" by William Rauch, Ivyland, Pa. Taken with Weltini at f.9 and 1/60 sec. on pan film with dark yellow filter. THIRD PRIZE: "Worry" by Don Bauer, Watford City, N. Dakota. Taken with National Graflex on Superpan Press f.8 and 1/250 sec. FOURTH PRIZE: "Whata Bone" by William D. Barkley, Baltimore, Md. Taken with Graflex on SS pan film at f.8 and 1/25 sec. FIFTH PRIZE: "Some Lid" by A. A. Grossman, Portland, Oregon. Taken with Contax on superpan film at f.6.3 and 1/125 sec.

### MONEY FOR YOUR PICTURES

Get busy with your camera and send in unusual pictures of people, animals, machines, trains, airplanes, etc. Each month we will pay $15 for the best picture received from readers, $10 for the second choice, and $5 each for the next three selections. Prints should be glossy, as large as possible up to 8x10 inches (although a small, clear photo is more desirable than a big fuzzy one) and should be accompanied by the following data: make and size of camera, type of film, and how developed and printed, lens opening and shutter speed, and lighting conditions. Wrap all prints carefully, put your name and address on the back of each, and include postage if you want them returned. Address all contributions to Photography Editor, MECHANIX ILLUSTRATED, 1501 Broadway, New York, N. Y.

# Revolving

The completed filter turret in use on a standard 9x12-cm camera.

Soldering the lens shade to the disc bracket. The inside is painted black.

Riveting the filter disc. A thin washer is used on each side of the disc.

PERHAPS the striking beauty of many color-filtered motion picture scenes has been responsible for their development, but color filters are now available in greater variety than ever before. No serious amateur photographer considers his equipment complete without one, and the majority have on hand a set of four or five that will handle most any scene you would care to point your lens at. The question most often raised is whether or not a particular filter has unintentionally been left at home, the question being accompanied by a hasty search through pockets and camera case.

Not only does the Revolving Turret keep your filters together and minimize breakage, but it is so very simple to use that you will not wish to be without one. Most filters are available in either the more expensive slip-on mounts or cells, which must be handled individually, or in the form of stained glass discs which must be fitted into a special holder before they can be attached to the camera lens. This all requires time, during which a scene—or pose—or action—may be lost forever. With the Turret, all that you need do is to slip it over the lens, and five or more filters are immediately available. Any particular one can be turned to a position in front of the lens in an instant. In addition, you can forget about a lens shade, for it will already be in place. The entire unit is complete and self-contained.

The dimensions given here are for a Turret fitting a 9 by 12-cm camera and may readily be altered to fit a smaller or larger job. The camera has a 5¼-inch focal length lens, the outside diameter of the mount being 1½ inches and the lens aperture itself being 1¼ inches. Five 1¼-inch stained-glass filter discs were purchased, in two shades of yellow, one of green, one of red and one of the colorless U-V type. Other combinations may be preferable, according to the type of work you will use them for. The Turret may be made considerably larger, to hold any number of filters you could possibly have use for, or to allow room for two or three auxiliary-lens discs which alter the focus of the regular lens for wide-angle, telephoto and closeup work.

To make a Turret for five 1¼-inch filters.

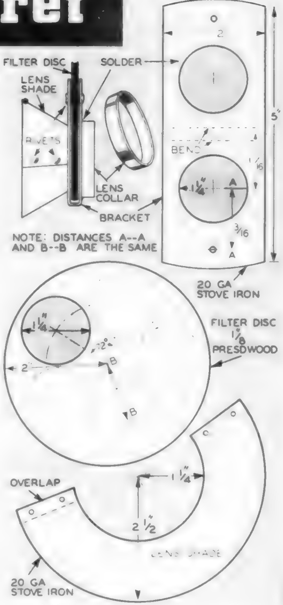
# Filter Turret

first cut a 4-inch disc from ⅛-inch black tempered Presdwood. Other material may also be used, but this is particularly well adapted to the purpose. Following the method shown in illustrations, divide the disc into sections 72 degrees apart for cutting evenly-spaced 1¼-inch holes. These must all be exactly the same distance from the center of the disc. While the holes can be made with a hand or scroll saw, if an expanding bit is available the work will be much more accurate. In this case, drill a test hole in a piece of waste stock and try one of the filters in it. As a tight fit is desirable, the bit should be adjusted until considerable pressure is required to force one of the filters into the hole.

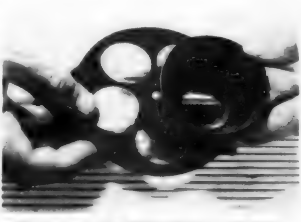
The two metal parts of the Turret were shaped from ordinary sheet stove iron and later given an attractive finish. After bending a 2-by-5-inch piece for the bracket, insert a scrap of Presdwood inside to support it while cutting the 1¼-inch hole. Each side must then be scraped clean for soldering the collar on one side, for fitting the Turret to the camera lens, and the lens shade on the other.

The shade was laid out with a compass, using a 1¼-inch radius for the inside and 2½-inch radius for the outside. For other sizes it is a good plan to first cut a paper pattern. The lap of the shade is riveted together before soldering it to the bracket.

A superlative, professional appearance was given all parts of the Turret, including the Presdwood disc, by coating them with air-drying crystallizing lacquer. This can be purchased in 25-cent cans from radio supply houses. When the lacquer is fully dry, which will require about an hour, coat the inside of the lens shade with a dead-black paint in order to eliminate all reflections. You can then fit the disc into the bracket and rivet them together, as illustrated. If a small fiber washer is used on each side of the disc it will turn freely. Make sure that each of the holes in the disc line up perfectly with the hole in the bracket. Force one of the filters in each of the holes, and if a tight fit has not been secured, use a toothpick to apply a very small quantity of cellulose cement which will hold them securely.



Constructional details of the revolving turret.



The filters are held by friction; however, a small quantity of cellulose cement is desirable.

Left—As the gas is generated it is simply poured into the mouth of the bottle. Above—When the gas is poured into a drinking glass containing a lighted candle, the light dies.

# GAS GENERATOR

ABSORBTION of oxygen from the air is a greater cause of developer deterioration, in ordinary circumstances, than is exhaustion of the chemicals from developing films and prints. If you do not believe this, occasionally uncork a bottle of fresh developer and you will find that it becomes discolored as quickly as if it had been in regular use.

One method of preventing oxidation is to keep the bottle filled to the cork, but this is not very practical. Instead of keeping the bottle filled with developer, it has been found from exhaustive experiments, an inert and chemically inactive gas will serve the same purpose and absolutely prevent oxidation.

This method may also be utilized for preserving tank developer, providing that there is a two or three-inch space at the top of the tank for the gas, and that a cover is provided to confine it.

The gas generator is a unique but simple device for making and delivering a heavy, odorless, inert gas (carbon dioxide) as it is required. One filling of inexpensive, common chemicals will generate from one to two dozen charges, according to the amount of

Merely remove the cap of the generator to refill the medicine dropper with acid, then replace the cap over the generator.

Left—Close-up of completed generator.

# Prevents Developer Oxidation

gas required each time. For the housing secure a 4 oz. wide-mouth glass jar with a Bakelite or screw cap. You will also need a bent glass drinking tube and a medicine dropper equipped with a large bulb.

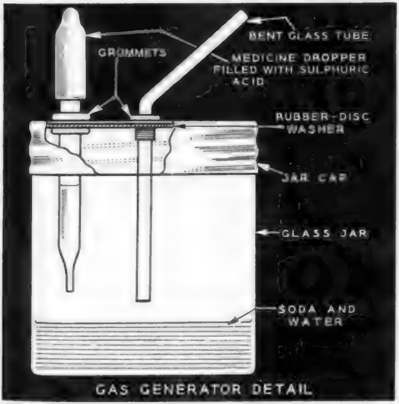
With a file remove a piece from the longer end of the glass tube, so that it will extend several inches inside the jar. Drill a hole in the center of the cap for this purpose and fit it with a rubber or metal grommet from an old radio or electrical part. Also drill a hole near the edge of the cap, fitting it with another grommet, for insertion of the medicine dropper. A rubber disc, with holes to match those in the cap, should be fitted into the latter to prevent gas leaks.

To charge the generator, place two teaspoons of baking soda (sodium bicarbonate) in the jar and add just enough water to cover it. Squeeze the bulb of the medicine dropper and fill it with sulphuric acid.

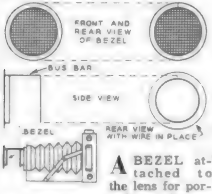
By squeezing the medicine-dropper bulb so that one or two drops of acid mingle with the soda, the gas is generated instantly. It is somewhat heavier than air and will drive the latter from the top of the bottle or tank.

One of the illustrations shows an easy test to prove that the gas displaces air and will not support combustion.

In replacing air in the top of a bottle with the gas, use only one or two drops of acid and cork the bottle immediately. The solution will last two to three times as long and give better results.



## Practical Portrait Attachment


FRONT AND REAR VIEW OF BEZEL
BUS BAR
SIDE VIEW
BEZEL
REAR VIEW WITH WIRE IN PLACE

A BEZEL attached to the lens for portraiture gives excellent diffusion. It is made by attaching a piece of stiff wire to the bezel and looping the other end around the lens.

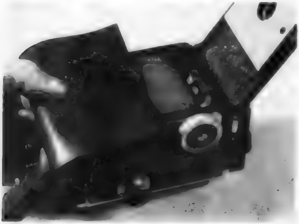
## Emergency Spotlight

TO MAKE this emergency spotlight, cut a hole in one end of small tin can for a socket and use a photoflood bulb. The light can be attached to a stand and is small enough to conceal for backlighting.

## Iron For Dry Mounting

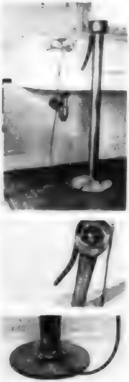
AN INEXPENSIVE, low wattage soldering iron serves ideally for use in dry-mounting photographs. Form the end of a piece of copper into a tube to fit over the tip of the soldering iron. Flatten the remainder of the tube and bend it at right angles for passing over the prints to be mounted.

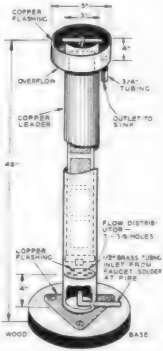
## Safety In Changing Film



A PIECE of black paper folded over the roll while threading the leader will protect the film while loading in bright sunlight. The paper is removed after slipping the roll in place

## Photo Negative Washer

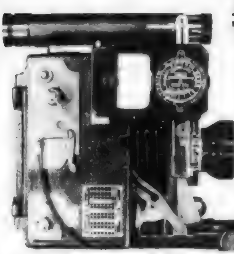


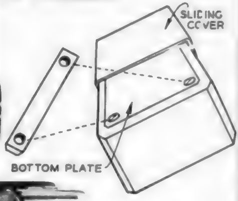

COPPER FLASHING
9"
3"
4"
OVERFLOW
3/4" TUBING
COPPER LEADER
OUTLET TO SINK
48"
FLOW DISTRIBUTOR — 7 - 3/8 HOLES
COPPER FLASHING
1/2" BRASS TUBING INLET FROM FAUCET SOLDER AT PIPE
4"
WOOD BASE

THIS negative washer insures a flow of water past the entire area of the negative. It consists of a vertical metal tube sealed at the bottom. Film is suspended at the top from a bar

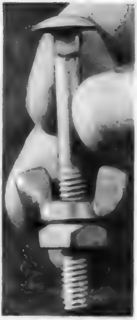
**CAMERA**

## Attaching G. E. Meter To Camera



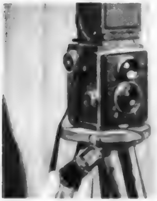


THE G. E. exposure meter with sliding hood may be fitted snugly in the flash gun fitting on the side of the camera. It was fitted by attaching a wedge-shaped piece of brass ⅛ in. thick to the bottom of the meter. In this position, it does not interfere with the adjustment of the camera.



## Improvised Tripod Screw

A ¼-in. carriage bolt with a nut and wing nut makes an excellent tripod screw. The wing nut is screwed onto the bolt to serve as a lock for the square nut and as a handle in tightening.



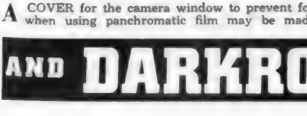
## Timer Holder

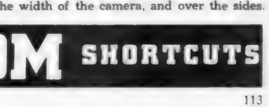
WHEN the self-timer is hung from the cable release, the cable eventually becomes worn. This may be avoided by attaching a screw eye or cup hook to the tripod top to support the timer.

## Protecting Corners Of Squeegee Tins

A GOOD way to protect the corners of squeegee tins from catching and becoming bent is to cover the corners with adhesive tape.

## A Cover For The Camera Film Window





A COVER for the camera window to prevent fog when using panchromatic film may be made from a stiff clock spring bent to cover the width of the camera, and over the sides.

## AND DARKROOM SHORTCUTS

# Dial Thermometer

1

2

3

ALREADY recognized among serious amateur photographers is the desirability of a thermometer that need not be lifted from the tank in order to read it, and one that does not occupy so much space in tray development. Good legibility is another factor that is seldom found in the ordinary mercury-type thermometers. Careful attention to temperature being such an important consideration in knowing *exactly* when to remove films from the developer, this simple and inexpensive dial thermometer will fill the need adequately. It incorporates all three factors and the dial is so legible, even in a dim red light, that it can be read from the opposite side of a darkroom.

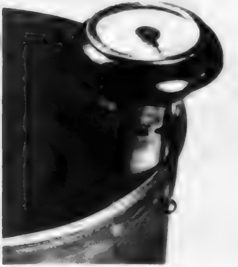
At most automobile supply stores and many department and drug stores you can purchase small bi-metal thermometers housed in a metal case considerably smaller than a watch. The one shown here has a diameter of only 1½ inches and has a small suction cup on the back for attaching to the windshield of an automobile. Under the trade name of "Tel-Tru Cub Thermometer" it sells for 25 cents. Surprising as it may seem, the device is exceedingly accurate, as testing with a clinical thermometer will show. It operates on the bi-metal thermostat principle and contains nothing to break or get out of order.

In addition to the thermometer you will need a 1-inch piece of ½-inch (outside diameter) nickel-plated brass or copper tubing, for tray use, or a 4-inch length for tank use. The nickeled copper tubing is preferable to brass because it conducts heat readily. You will also need a small pencil clip.

By prying up the rim of the thermometer dial (1), it and the mechanism can be lifted out. Also remove the rubber suction cup (2), from the

[*Continued on*
[*page* 120]

4



5

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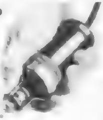

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# Amateur Photo Puzzlers

## COLD WEATHER PHOTOGRAPHY

**What is the effect of "cold" on developing?—T. R. Williams, Bellmore, N. J.**

During the winter months photographic operations are somewhat changed to compensate for the change in temperatures of water, etc. This is especially true in development. The developing solutions should be kept at about 65 degrees. If you attempt to develop a normal negative in icy cold water as it comes from the tap, it will look as though it were underexposed. This is due to the fact that cold retards the chemical action. The remedy, then, is to warm up the solutions until their temperatures are right. Keep in mind that some chemicals, like hydroquinine, in solution are practically inert when very cold. One method of warming chemicals is to place the trays in warm water and then pour the chemicals into the warmed trays. Of course, the temperature of the room also controls the temperature of the equipment and chemical solutions. Therefore, in attempting to control temperature, don't forget the condition of the room itself which should also be near 65 degrees.

## CONTACT AND ENLARGING PAPER

**What is the difference between contact and enlarging papers?—F. G. Heill, Jr., Anchorage, Ky.**

Contact paper is usually sensitized with cloride salts while enlarging paper is sensitized with bromide salts. Chloride sensitizer is less sensitive to light than bromide and therefore more suitable for contact printing, which in itself requires little light because of the close proximity of the paper to the negative. A faster paper is desirable in enlarging, so a bromide sensitized paper is used. Some enlarging papers are sensitized with a chloro-bromide solution to obtain certain printing qualities. Many printing papers are sensitized by a combination of these salts (in different degrees) to produce different tonal effects.

## CLEANING NEGATIVES

**I have some old negatives, mostly photographic plates, which are covered with dust. What is the best method for cleaning them?—R. H. McGinnis, Milwaukee, Minn.**

A complete rewashing of the plates and film should remove the dust entirely. Try washing them in several changes of water at a temperature of between 65 and 70 degrees. After washing, squeegee them on both sides with a chamois or cellulose sponge. Wipe lightly using different parts of the sponge each time and rinse it frequently in order not to carry dust or lint from one film to the other. Then place film to dry, preferably at an angle so that any water still remaining will drain off from a corner of the film instead of settling along one edge.

## PURE WATER IN SOLUTIONS

**Tap water in my region is highly chlorinated and distilled water is not easy to get in large amounts. What is the best thing to do under these circumstances when pure water is needed for mixing chemical solutions?—R. H. Taft, Dallas, Tex.**

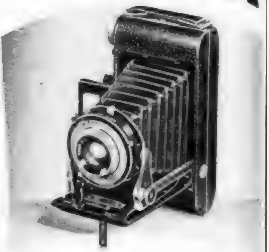
Water of excellent purity free from sediment and salts of the vicinity may be obtained by boiling the amount of water desired for about 10 minutes. Then it may be allowed to cool and settle and filtered through a chemist's filter paper which has been placed in a funnel. The result will be water [illegible] [illegible]. A glass vessel for boiling may be used as an added precaution.

---

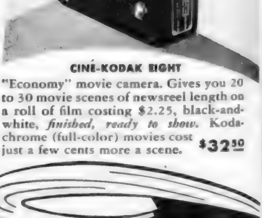
## MECHANIX ILLUSTRATED AWARDS $40 EACH MONTH FOR BEST PHOTOS SUBMITTED BY READERS

**The editors of MECHANIX ILLUSTRATED distribute $40 in cash awards each month to the five persons who, in their opinion, submit the best pictures suitable for publication in the MECHANIX ILLUSTRATED Photography section. Full particulars regarding these awards will be found in this issue on page 107.**

KODAK



**KODAK SENIOR SIX-20 (f.4.5)** . . . Combination of body shutter release and eye-level finder offers new picture-making certainty . . . minimizes camera movement, catches the scene when it's exactly right. Kodak Anastigmat *f*.4.5 lens; 1/200 Kodamatic shutter. One-finger bed release. 2¼x3¼-inch pictures. **$28**



**CINÉ-KODAK EIGHT**

"Economy" movie camera. Gives you 20 to 30 movie scenes of newsreel length on a roll of film costing $2.25, black-and-white, *finished, ready to show.* Kodachrome (full-color) movies cost just a few cents more a scene. **$32.50**

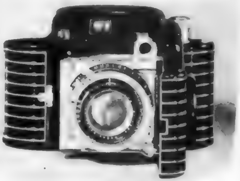
# CHRISTMAS CATALOG

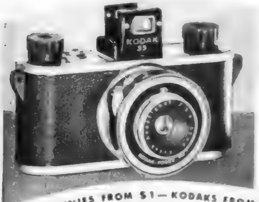
**KODAK RETINA II** (*left*) with anastigmat *f*.2.0 lens. 1/500 Compur-Rapid shutter. Coupled range finder. Body shutter release. Price, $140. Kodak Retina II, *f*.2.8, $115. (Prices include sportsman's field case.) Both models load with a wide range of Kodak Film, including Kodachrome for gorgeous full color. **$140**

**KODAK RETINA I** (*not illustrated*) . . . the original Retina, with Kodak Anastigmat EKTAR *f*.3.5 lens. Shutter, 1/500 Compur-Rapid. Film-centering mechanism. Exposure counter. **$48.50**

**KODAK BANTAM SPECIAL** (*right*) Lens, Kodak Anastigmat EKTAR *f*.2.0—extra-fast, super-corrected. Shutter, 1/500 Compur-Rapid. Built-in military-type range finder linked with lens mount gives hairline focus instantly. Film-centering device locks film accurately in position for each exposure. New low price includes field case. **$87.50**

**KODAK BANTAM FAMILY** also includes Kodak Bantam *f*.4.5 at $27.50 and Kodak Bantam *f*.5.6 at $16.50. All three models load with full-color Kodachrome Film. Lower priced Kodak Bantams, for black-and-white pictures only, include the *f*.6.3 model at $9.50 and *f*.8 model at $4.75.





**NEW KODAK 35 FAMILY** (*left*)

A really outstanding group of new precision miniature cameras that are priced impressively low. Fast lenses—fully corrected for color—and accurate shutters. For critical results in black-and-white, or full-color Kodachrome. Kodak 35, with *f*.5.6 lens and 1/100 Kodex shutter (*illustrated*), $18.50; with *f*.4.5 lens and 1/150 Diomatic shutter, $29.50; with Kodak Anastigmat Special *f*.3.5 lens and 1/200 Kodamatic shutter, $39.50. **$18.50**

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# Guardians Of The Airways

[*Continued from page* 56]

reau staff and now one of its most relied-on men, inspect planes for licensing, check major repairs, spot a damaged propeller that will mean trouble in two or three months although it is safe just now, put a young man trying for his private flyer's license through his paces—in short, make sure to the best of his highly-trained ability that nothing and no one unsafe was licensed at Richmond, Va., that day.

Like each of the 58 inspectors scattered throughout the United States to check America's 10,000 planes and their pilots, Povey flies to work each morning, making a different town each day. Based at Washington, where he makes his home, he is a familiar figure at 7:30 o'clock each morning outside Hangar No. 2 at Bolling Field. There, readied by Department of Commerce mechanics who keep the Bureau's planes in trim, is his trim Fairchild airplane.

Built to carry four, the plane is licensed for only two people today because it carries a mass of navigating and radio equipment not found on the ordinary private plane but essential to a pilot who flies for work, not pleasure.

His schedule is made out a month in advance and sent to airports in the territory he covers. When the trim blue and orange ship drops gently out of the sky shortly before the working day begins, airplane owners and would-be pilots are on hand.

No armchair inspector is Povey, or any of the other government men either, if he is a fair example. Turning the lounge room in one of the airport hangars into his office for the day, Inspector Povey is in and out every few minutes. Planes he inspected were examined literally from the ground up for the slightest flaw that might spell trouble. One moment he was under the plane checking the landing gear; a few minutes later, while the inevitable airport crowd looked on, he crawled onto the upper wing of the biplane to make sure nothing was amiss there.

While he looked over airplanes that needed relicensing in the morning, one young man, after his private flyer's rating, worked in the improvised office at the written examination required in all pilot tests. The paper was graded at lunch, up the road in a small roadside restaurant. Since the examinee appeared to have passed (Povey works up the final grade later, at home) he was given the flight test in the afternoon.

Three times he took off in the light two-passenger plane on which he had learned, and landed it within a 300-foot distance marked by flags after carrying out maneuvers required by the test. Inspector Povey then went aloft with him and put the plane into maneuvers resembling emergency situations; it was the would-be pilot's job to pull the plane out. A little later, his day's work at Richmond done and his goodbyes said until next month when he will return, Inspector

[*Continued on page* 128]

# MI Boat Started Racing Class

[*Continued from page* 65]

in the SUN fleets several examples of simplified practice have evolved, and the benefits of their experiences are now available to prospective builders.

Fourteen SUN Class Sloops are in commission on San Francisco Bay, and four more will be launched shortly. The average construction costs of these boats has run from $125.00 to $150.00, complete with good sails. Nearly all of these San Francisco SUNS compete for the Richardson Bay Yacht Club, an organization that can be said to owe its very existence to the SUN Class boats.

Of this fleet the Number One boat, the *Jean R.*, was the work of H. B. Richardson, of Mill Valley. At an age when most men are thinking of activities far less strenuous and exciting than sailing, Mr. Richardson chose to build himself a boat from the plans he had seen in this magazine. Locally the *Jean R.* made a most favorable impression, and soon the younger men in the community were at work on duplicates of their own. After joint regattas with the other designs in the club, the SUN group took steps in 1937 to organize themselves into the Northern California Sun Class Association. It is known that SUNS have been built at many points all over the United States, and it is the hope of the local organization that steps may be taken to collate the developments of all fleets to a point where they can be a National SUN Class body. To this end, their Secretary, R. V. Grew of 131 Hillside Avenue, Mill Valley, California, has placed himself in readiness to help by extending to distant groups the benefits of the experience of the highly successful Northern California Association. National organization would make it possible for intersectional regattas to be held, and for national point standings to be computed.

In Northern California the SUN Class functions as one of the four one-design sailing classes comprising the Small Boat Racing Association of Northern California. Member organization are the Richardson Bay, Y. C., Corinthian Y. C., San Francisco Y. C., and Richmond Yacht Club, all on San Francisco Bay, and the Lake Merritt sailing Club in Oakland, Ionic Sailing Club in Stockton, Clear Lake Yacht Club, and the Lake Washington Sailing Club in Sacramento. Each of these clubs has a scheduled regatta every year, and the SUN Class sloops always turn out in force. It is interesting to note that, in order to reach the scenes of many of these regattas, it is necessary to haul the boats on trailers behind the members' cars, the Clear Lake event requiring a drive of some 140 miles up into the mountains. The good turnouts attest to the popularity of the class.

As originally designed, the SUN rig carried a relatively short mast and a correspondingly long boom. It seemed to suit the hull admirably, but some builders thought that the more universally popular tall rig might be smarter and more effi-

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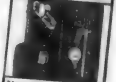

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cient. The proposed new rig provides for 18 inches more mast height, and a boom shortened in proportion to admit of the rigging of a bumpkin and permanent backstay. A SUN thus constructed and in service has created favorable comment as to appearance, but it has not yet been proved that she is more able. It is contemplated that either rig may be used at the option of the builder, thereby working no hardship on the owner who doesn't want to convert his present equipment.

The SUN Class in this area has enlisted sailors—male and female—covering a wide age span. In a recent race the keenest competition for first place was waged between Capt. Richardson, with his charming daughter as crew, and Bill Rus, a high school student, with a young bank clerk, Jack Smith, as crew. Among others, the local fleet embraces a postmaster, a draughtsman, a cabinetmaker and a butcher. To those to whom time, money, and experience are held at a premium, the SUN Class Sloop is the acme of value.

An auditorium with ideal acoustics would have walls, ceiling and floor treated to avoid or regulate echo and reverberation, and also would be air conditioned as to temperature and humidity, says a physics professor.

*If you are interested in any of the items mentioned in this issue, send a stamped, return envelope for the address of the manufacturer.*

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## Dial Thermometer

[*Continued from page* 114]

other side, exposing a ½-inch hole in the case. One end of the nickeled tubing can be fitted tightly in the opening, coming flush on the inside, where it may be soldered lightly (4). The other end of the tubing may be closed with a metal or dowel plug, or the inside may be coated with protective varnish. Finally (3), solder the pencil clip to the tubing directly underneath the thermometer case and replace the dial and mechanism. Under no circumstances should the latter be tampered with. As the precaution against contamination of the developer by exposed solder, cover the latter and any bare copper of the tubing with asphalt varnish. When only plain copper tubing is available, coat it inside and out with asphalt varnish. In using the device (5), see that the tubing extends as far as possible into the developer. For tray development, using the shorter copper tubing, merely set it in one corner of the tray. Check once with a reliable mercury-type thermometer and the device may be relied upon to give accurate, legible readings indefinitely.

## Plastic Wood Inlaying

[*Continued from page* 93]

with oil stain and not with oil colors. Cut out and inlay diagonal sections before cutting out the other sides.

The craftsman will find many opportunities for developing various projects suitable for his particular needs. The drawings show the method of building up plastic and natural wood combinations for lathe turning. The colors can be varied and combined to meet almost any requirements. A word of caution when working with the Plastic Wood—be sure to keep the can closed except when removing material. Inasmuch as the solvent evaporates rapidly, the craftsman will find that the material will harden in the can if it is left open for long periods of time.

The River Seine is 250 miles long as the crow flies, but its meanderings give it a total length of 482 miles.

*If you are interested in any of the items mentioned in this issue, send a stamped, return envelope for the address of the manufacturer.*

When you complete a how-to-build project, why not send a photo and description of it to the Editor's Workbench department? Perhaps you will be awarded one of the many cash prizes offered by MECHANIX ILLUSTRATED each month. (See page 12).

# New Chair Seats For Old

[*Continued from page 90*]

The finished seat may be oil-stained, shellacked, varnished, or left in the natural state, as you choose.

**HICKORY SPLINT WEAVING:** This is more properly called "pith caning," for the pith cane, which closely resembles real hickory splints, is so much more economical as to make its use almost universal. It is commonly used on seats where the four sides are round rungs set into the legs.

Dampen a quantity of the cane. Double the end of a cane back about an inch, and tack it securely to the under side of the side rung, close to the back of the chair. Draw it across to the other side underneath, up over the other side rung, and proceed to wrap or wind it around and around, keeping the strands tight and close together. It is important to begin at the narrowest part of the seat to wind the cane. If the frame is not square, it will be necessary to tack shorter pieces of the cane over whatever areas are left open after this wrapping process. Wrap these short canes completely around the rungs and tack them underneath.

The next step begins the first real weaving. Choose the pattern you wish to follow and tack a cane as in the first step, to the under side of a rung, draw it on the under side toward the other edge of the seat and begin weaving, following the pattern you have selected or devised. Complete the weaving in irregular areas with short pieces, tacking the ends as you did in step 1.

The under side of the seat should be woven, too, to give greater tension to the canes when they dry. For the beginner, it is advisable to choose a pattern where the canes do not cross under many strands, as this is more difficult.

When the end of a cane is reached, tack it down to the under side of a rung, clip off the loose end, tack on a new cane, and proceed. After you are through weaving and the cane has dried, burn off all the loose hairy fibers with a torch, sand the seat lightly and give it a coat of shellac or varnish.

**FIBER ROVING:** Your grandfather used to call it "swamp-reed caning," and did it with twisted cat-tail leaves, but you can do it with hemp or manila fibers, or any kind of stout twine or cord. It is woven on a seat frame consisting of four rungs set into the legs, as in hickory splint caning.

To start, tie a cord around one of the rungs with the knot well down the cord, using a bowline knot. This knot will not slip and will be covered up as the weaving progresses. Draw the cord tightly to the under side of the opposite edge near the leg, up over the rung, and then down under that strand and under the rung on the right, then up over the rung on the right, across the seat, under the rung, up over the top again, and so on, continuing until the seat is covered. When you are almost through weaving, insert pieces of cardboard or folded newspapers inside of the woven sections. When the weaving is completed, tie the end of the strand on the under side of the seat.

Variations may be made in the weaving by tying on occasional lengths of different colored fiber, being sure to tie on enough to make the resulting figure symmetrical. In roving, keep the strands as tight as possible, crowded close on the rungs, and tie on new fiber so that the knots will be covered up.

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# The Hi-Fi Receiver

[*Continued from page 106*]

approximately 50 per cent greater. At 100 cycles and below the gain is nearly doubled. This is because the impedance of C10 increases as the frequency is lowered and consequently the voltage developed across the plate load increases in like manner.

The treble control is formed by R15, a .5 meg. potentiometer, and C12, a .00025 mfd. condenser, which are connected in shunt with each other and in series with the input grid of the 6C8G. If C12 were not in shunt with R15, only one-half the audio voltage from the 6R7 would be applied to the 6C8G grid. With C12 in position, high frequencies are by-passed across R15 while the impedance of C12 is so high at low frequencies that C12 does not by-pass them. The result is a gradually rising high-frequency response above 4,000 cycles which compensates for the losses sustained in the detector by-pass, [illegible] as well as practically all the high-frequency losses in the tuning system.

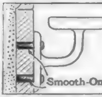
The 6C8G double-triode phase inverter works in the following manner: The audio voltage applied to the input grid (which may be either the grid cap or pin terminal no. 5) is amplified in the plate circuit of the corresponding section and [illegible] across R17 and R18. On the positive half-cycle of [illegible] grid voltage, increased current flows in the plate [illegible] causing an increasing voltage drop across R17 and R18. This voltage drop is negative with respect to its B

[*Continued on page 124*]

**ANCHORING PARTS in CONCRETE or TILE**

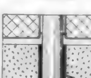
**TIGHT anchoring in concrete or tile—one of your worst puzzles—is easy with Smooth-On No. 1.**

**For light service, as in attaching bath-room fixtures (Fig. 1), hooks, etc., drill slightly oversize holes, fill with a soft putty of Smooth-On No. 1, set screws in this soft cement and turn up tight.**



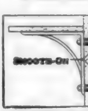
**1. Fixtures set in tile or masonry.**

**To anchor a railing post (Fig. 2), make a hole large enough to insert end of post, and tamp the space surrounding the end of post full of Smooth-On No. 1.**



**2. Railing post.**

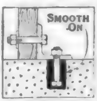
**To anchor bolts in a concrete wall, make the hole large enough to clear the bolt head and of proper depth. Insert the bolt head and fill around bolt with Smooth-On No. 1. Large bolts can be set in Smooth-On No. 7. Tamping the cement into place gives a tighter hold. When the cement is hard, the bolt is ready for service.**



**3. Shelf bracket**

**Lag screws are held by making the hole just large enough in diameter to clear the screw. Put a soft putty of Smooth-On No. 1 into the hole, insert lag screw and turn it up into place.**

**In all of the above applications, the slight expansion of Smooth-On No. 1 in hardening gives a very strong hold of bolt, screw or post.**



**4. Wood partition.**

**Use Smooth-On No. 1 in the home also for tightening loose parts and stopping leakage of water, steam or gas.**

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## Part Of Stamps Over-Printed

[*Continued from page* 82]

prints, including sketches of planes such as flown on those particular flights. Thus older issues have been stamped for new uses! The Philippines with the Madrid-Manilla flight, and the New Caledonia air-overprints for the Paris to Noumea (New Caledonia) flight have been so honored.

A number of these air-overprints have risen in price, so that they were good investments.

Overprints have been used for creating new values in postage stamps to meet a sudden currency need during a period of fluctuation. The German 1920 issues were an outstanding example. Then we have overprints on postage for special, or commemorative purposes. Here we may list Siamese stamps of 1929. They were overprinted for the "Wild Tiger Corps." These overprints consist of appropriate inscriptions, in the native language; some add English words too.

The founding of Hawaii produced overprints on U. S. two-cent postage stamps. The opening of a railroad from Quito to Esmeraldas in 1926, produced overprints on 1915-25 postage stamps of Ecuador. The overprints were in black or red; and besides a suitable inscription we find the drawing of a train with a smoking locomotive!

## "Men With Wings" Contest

[*Continued from page* 66]

Connecticut, office at 20c each), but for the benefit of new readers who may have missed the listing, it appears again on this page.

CONTEST RULES

Anyone except employees of Paramount Pictures and Fawcett Publications can enter the contest. The prizes will be awarded to the 2 persons who, in the opinion of the judges, send in the most nearly correct answers to the ten aviation questions listed in the box on page 63 and the best 25-to-50 word letters on the subject—"Who Is Aviation's Greatest Hero?"

Editors of this magazine are the judges in this contest and their decisions will be final. No entries will be returned. Contestants have until midnight of December 27, 1938, to mail in their entries, and the winners will be announced in the March, 1939 issue of MECHANIX ILLUSTRATED. Address entries to: Contest Editor, MECHANIX ILLUSTRATED, 1501 Broadway, New York, N. Y.

PRIZES

First prize in the big "Men With Wings" contest will be the free round-trip airline trip to Hollywood, California, as well as the added treat of visiting the Paramount Studios, to meet famous movie stars and visiting the Douglas Airplane Company plant in Santa Monica.

Second prize will be a famous World's Champion Baby Cyclone miniature gasoline engine for model planes and boats donated by Aircraft Industries of Glendale, Calif.

Third prize consists of a complete kit of parts for assembling a six-foot Comet Clipper gas-powered model airplane (less engine) donated by the Comet Model Airplane Company of Chicago, Ill.

Fourth prize will be an Atwood "Phantom" miniature gasoline motor donated by Phantom Motors of Los Angeles, Calif.

Fifth prize is a complete kit of parts for constructing a "Miss America" gas model plane (less engine), donated by the Scientific Model Airplane Company, of Newark, N. J.

Sixth prize consists of a Gwin Aero miniature gasoline engine donated by the Bunch Model Airplane Co., of Los Angeles, Calif.

Seventh prize is a Brown, Jr., Model B miniature gasoline motor donated by Junior Motors Corporation, of Philadelphia, Pa.

Eighth, ninth and tenth prizes are complete kits (less engines) for constructing "Maxwell Bassett," "Flying Quaker" and "Quaker Flash" gas-powered model airplanes, respectively. These three kits were donated by Megow's of Philadelphia, Pa.

The eleventh and twelfth prizes consist of complete kits of machined parts for assembling G. H. Q. miniature gasoline engines, which were donated by G. H. Q. Motors, Inc., of New York, N. Y.

Thirteenth prize is a complete kit of parts (less engine) for constructing a Bay Ridge "Mike" gas-powered model airplane donated by the Bay Ridge Model Airplane & Supply Co., of Brooklyn, N. Y.

Fourteenth prize consists of a Brown, Jr., Model D miniature gasoline engine, completely assembled and including a streamlined exhaust manifold, a Polk's Perfect-Pitch propeller with a solid aluminum spinner. This motor, with accessories, was donated by Polk's Hobbies Shop of New York, N. Y.

Fifteenth prize is a construction kit for building a Silver Streak rubber-powered model air-

[*Continued on page* 128]

## Making Tree Ornaments

[*Continued from page* 84]

assures a neat job of matching edges and surfaces.

Scrap galvanized tin can be obtained from tin shops. These small pieces are generally in irregular shapes which, when cut in various ways, form ideal decorations for an outdoor tree. They sparkle in the sunlight and artificial light, giving beauty to the tree both day and night.

Galvanized tin will not rust from the dampness of the December air. However, ordinary tin will, so it is best to paint each unit made from this type of tin as previously mentioned.

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# General Arnold Appointed Chief Of The Air Corps

[*Continued from page* 44]

contributor to these pages. For these reasons we take special pleasure in outlining, briefly, some of the highlights of his brilliant career which led to the appointment as Chief of the Air Corps.

General Arnold is an aviation pioneer in the true sense of the term. When he reported (27 years ago) at Sims Station, now the site of the Air Corps Depot at Fairfield, Ohio, he found a barn-like structure which housed several of the early Wright biplanes, with their 40 h. p. engines, their two propellers in tandem, their two seats in front, side by side, and their three control sticks. His contemporaries in those early days of aviation were such well known pioneer aviators as Walter Brookings, Ralph Johnstone, Arch Hoxie and Arthur L. Welsh, comprising the original flying team of the Wright Brothers; Lincoln Beachy, the dare-devil; Claude Graham White, the Englishman; Louis Paulhan, Jules Vedrines and Hubert Latham, the Frenchmen; and last, but by no means least, Lieut. Benjamin D. Foulois, who completed four years of service as Chief of the Air Corps in December, 1935, and was then placed on the retired list as Major General.

During his first year as an aviator, General Arnold made 140 flights for a total duration of 29 hours, a record to be proud of in those early days. The following year the number of flights increased to 209, and he garnered new laurels for the miniature Air Corps by initiating many of the early aviation developments and finally winning the Mackay Trophy. He was the first officer to win this Trophy and, after a lapse of 22 years, won it again.

General Arnold won the Trophy first in 1912 by flying over the triangle Washington Barracks, D. C., Fort Myer, Va., and return to College Park. In the summer of 1934, General Arnold was in command of the flight of ten B-10 Martin Bombers, flying from Washington, D. C., to Fairbanks, Alaska, and return. He was awarded the Mackay Trophy for that year for his leadership on this expedition.

In the operation of the Air Mail by the Army Air Corps, from February, 1934, to the following May, General Arnold was assigned as Officer in Charge of the Western Zone. This was a much more difficult task than his first assignment in connection with air mail operations, when, in September, 1911, he carried the first air mail in the United States from Nassau Boulevard Airdrome, Long Island, to Hempstead, Long Island, a distance of five miles.

On March 1, 1935, General Arnold was assigned as Commanding Officer of the 1st Wing (West Coast) of the General Headquarters Air Force, with headquarters at March Field, and was given the temporary rank of Brigadier General during the period of this assignment.

On December 28, 1935, General Arnold was appointed Assistant Chief of the Air Corps, with the rank of Brigadier General, for a period of four years.

General Arnold has the distinction of being one of the few remaining officers in the Air Corps holding the rating known as "Military Aviator". In addition, he holds Expert Aviator Certificate No. 4, and Pilot License No. 29.

# The Hi-Fi Receiver

[*Continued from page* 121]

supply while the audio grid voltage is positive. Thus the voltage drop is opposite in phase to the grid voltage. Now, if the amplification is 25 in this triode section, and we take 1/25th of the voltage developed across R17 and R18 and apply it to the grid of the second section of the 6C8, we get out across R25 the same voltage as that across R17 and R18, but reversed in phase. This applies if the amplification of each section is precisely the same and the plate loads are equal. Practically, there are slight differences but they are not noticeable in operation.

The output of each section of the phase inverter is fed to the grids of the 6A5G power tubes. The 6A5G is a cathode-type 2A3 with a 6.3-volt heater. The 2A3 has long been considered the Rolls-Royce of power tubes, the sole objection being its tendency to produce hum due to its a. c. operated filament. The 6A5G removes this objection through indirect cathode heating, yet retains all the good features of the 2A3. This pair of tubes delivers 10 watts undistorted power output and the low plate resistance of each tube, about 800 ohms, damps spurious movements of the speaker so that reception of far superior quality is obtained than is possible with pentodes or even beam-power 6L6's as normally operated.

The chassis is made of heavy-gauge steel and measures 11x17x3 inches. It is well to lay out every hole and drill

[*Continued on page* 132]

## Study Blood With Microscope

[*Continued from page* 103]

If the lobe of the ear is preferred, sterilize and then have some one else handle the needle and slide. When examined miscroscopically with the light cut down, these fresh slides will show a great many cells floating about and gathering here and there in clumps like a stack of poker chips, termed rouleaux. These are the red blood corpuscles or *erythrocytes* (red cells) and appear circular in flat view or as biconcave discs when seen on edge. In such thin sheets as now observed they are no longer red but straw yellow, the red color being due to an optical effect when in layers of some thickness.

The fluid vehicle is the plasma and makes up 65% of the blood, solid matter the other 35%. The plasma in turn is 80% water and contains also the *fibrin* which forms clots upon exposure to air. Upon removal of all cells, particles and fibrin, the clear watery liquid remaining is the blood *serum*, but is by no means simple since it carries digested food materials of many varieties, dissolved minerals, hormones from the ductless glands, antibodies produced to combat foreign organisms and other substances.

Nor are we through. There are the white corpuscles or *leucocytes* (white cells) and the minute *blood platelets* which assist in clotting. Erythro-

[*Continued on page* 130]

## Toy Invention!

[*Continued from page* 39]

The most famous of all the famous Savage toys appeared shortly after 1930, when the popular pop-up toys came into being. The pop-up is made of beads of wood strung on strings and actuated by two pull-cords that make the figure flop or stand erect. Savage doesn't know how he thought of it. He was trying to think of something original, with movement, that worked simply, didn't cost much, and which required some participation on the part of the person operating it. Whether or not he thought of it in his sleep or while he was just "sittin' and thinkin'" or while working on some other idea which suggested the pop-up, is undetermined. In any case, the pop-up kritter wasn't born. It just "grew." Tail Spin Tabby was the original pop-up and more than 3,000,000 have been sold. Tabby was invented originally in 1927, but manufacturers were unanimous in their belief that it wouldn't sell profitably. Five years later, however, the Fisher-Price Co. saw the possibilities and brought it out at 75 cents. Later it was reduced to 50 cents and even later production costs were gotten down so that it could be sold at 25 cents. Then its sales zoomed. Lofty Lizzie, Stoopy Storky and Lop-Eared Louie, another

[*Continued on page* 133]

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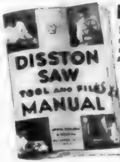

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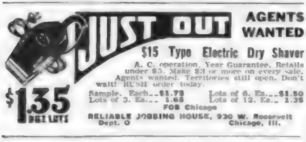

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## Radio Forecasts The Weather

[*Continued from page* 69]

in 1936 at Blue Hill Observatory of Harvard University.

How does this radiometeorograph function? First, a few points on the mechanism. Four principles of operation have been developed in the U. S. The instrument selected by the Weather Bureau for this year's soundings was designed by the National Bureau of Standards. It is of the audio oscillator type and does away with clocks and motors, characteristic of most of the others.

The Bureau of Standards' radiometeorograph utilizes instead the decrease in atmospheric pressure as the balloon rises to move a small switch arm over a series of equally spaced contacts that are separated by insulating strips. The contacts are so spaced that for a decrease in air pressure equivalent to a hundred feet the switch arm moves from one contact to the next, causing the radio transmitter to send signals having predetermined audio notes that identify these contacts.

Contacts intermediate to those identifying pressure are wired to a resistor controlled by a hair hygrometer. The switch arm passing over these contacts connects this variable resistor into the transmitter circuit so as to send signals having an audio note proportional to the value of the resistor.

When the switch arm passes over the insulating strips lying between the contacts, the frequency of the audio note is determined by the electrical resistance of a small glass tube of sulphuric acid. The resistance of this column of acid changes markedly with temperature so that the trans-

[*Continued on page* 143]

## A Bunk-House For Dogs

[*Continued from page* 94]

consisting of one-by-three nailed together at right angles.

The opening for the tunnel can be made in the center of the rear wall, or in a corner, which will allow more room for the bunk. An opening is cut through the wall of the house, leading to a convenient corner of the kitchen or hall. A simple frame is attached to the wall and base board, and a small door installed with hinges and catch. Use matched boards for the tunnel, and make the construction tight to keep out rain and wintry drafts. Paint the kennel to match the house. If desired, one-half of the roof can be hinged to the other half, and the eaves attached with hooks to the wall, so that the kennel can be cleaned easily. In this case, a strip of heavy rubber or old linoleum can be used as both hinge and ridgepole.

You will find the tunnel convenient for letting out the puppy for his exercise.

# Cracking Down On Quacks

[*Continued from page* 49]

for test lenses and sent in a like number of "specifications" for eye-glasses. In not a single instance was the proper kind of spectacles sent. Worse than that, in some cases a number of eye-glasses were ordered for the same person (writing under fictitious names) and always the company forwarded spectacles of different vision!

All sorts of people are mixed up in mail-order charlatanry. A former butcher decided to go into the fake medicine manufacturing business. He set up shop in a New England state and started with a corn salve. Later he extended his line to include a cough medicine, female tablets, pills for rheumatism, lung tonic, nerve syrup and "antiseptic roots." These preparations were labeled with fantastic, curative claims for a wide variety of ailments.

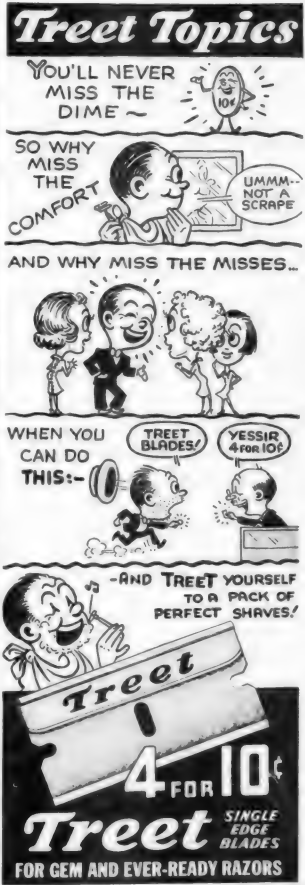
The manufacturer at first confined his maneuvers to his immediate locality, employing no sales agents and doing little advertising. But his business assumed greater and greater proportions. So finally he shipped some of his nostrums across the state line, thus making his goods subject to seizure and himself liable to prosecution for violation of the Federal Food and Drugs Act. He was fined $425 by the Federal Court for the District of New Hampshire on 17 counts for labeling his preparations with false and fraudulent claims as to their ability to cure or prevent disease.

Paul Anacker, better known to swindled thousands as Dr. Yosmite Nabona, who "adopted" himself into the Navajos of Colorado, is in the toils of the law again. He was fined $200 in the Federal Court at Los Angeles recently. Operating from Long Beach, Calif., where his outfit was called "Navajo Industries, Inc.," and formerly from Colorado Springs, Colo., where he was known as the "Navajo Indian Remedies, Inc.," Anacker had shipped various herbs, powders, pills and liquid medicines which were in violation of the Food and Drug Act.

Investigation by Federal Inspectors prior to the trial had indicated that "Dr. Nabona," who posed as an American Indian, was in reality a German by birth, and that he sent money at fairly regular intervals to a person, Frieda Anacker, in Germany. Although he listed in his advertising booklets a hundred diseases, including pneumonia, epilepsy, paralysis and tumors, "Doctor" Nabona's sole claim to diagnostic and professional ability rested from a "diploma" purporting to come from the University of Berlin, which when translated, proved to be a midwife's certificate.

Before his case came to trial, Anacker's trail had led across the country and back. He changed his place of business from his original location at Colorado Springs, Colo., to Los Angeles. But the earthquake of March, 1933, interrupted his prosperity there. He went to Tucson, Ariz. Later he was arrested in El Paso, Texas, on

[*Continued on page* 134]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## Guardians Of The Airway

*[Continued from page 118]*

Povey took off for home in his Fairchild plane

But not so soon, for he had to stop at Beacon Field on the outskirts of Washington to check a repair to a plane owned by the chairman of the House Military Affairs Committee, Representative Summers, an enthusiastic private flyer. The Civil Air Regulations, the code of musts and must nots for non-military flyers, require that every major repair must be approved.

Inspector Povey's job is concerned with all non-scheduled flying in his district. In addition to licensing he must investigate all accidents and all violations of flying regulations—like stunting 200 feet above an airport. He turned up one headache this day: an unreported accident in which both plane occupants were student pilots and the plane was unlicensed. One of the students, flying as a passenger, was killed. Each person who might know something about the mishap was quizzed.

"I get fine cooperation from practically everyone I have to deal with," he declares, "but every inspector, including myself, has a few problem flyers in his territory." But outside of that, the job of keeping junk out of the air and incautious ladies and gents out of the sky is not a baffling one.

It was 7:30 p. m. as he banked his ship coming into Bolling Field, his day's work finished. Today was a relatively light day; yesterday he had to test six pilots at College Park, Md., in addition to examining planes for license. Days like that were strenuous indeed; but there would be more of them, anyhow, as aviation continues to grow

## "Men With Wings" Contest

*[Continued from page 123]*

plane, donated by the County Club Aero Supply Co., of Kansas City, Mo.

Sixteenth prize is a kit of parts for constructing a rubber-powered Cabin Endurance model plane donated by the Air-King Model Co., of Portland Oregon.

Seventeenth prize is a kit of parts for building a 50-inch rubber-powered cabin endurance model airplane, which was donated by Paul K Guillow, of Wakefield, Mass.

Eighteenth to twenty-third prizes, inclusive consist of copies of "Your Wings," a complete aviation "ground school" course in book form written by Assen Jordanoff, and published by Funk & Wagnalls Co., of New York, N. Y., who donated the books.

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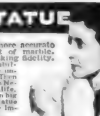

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## Study Blood With Microscope

[*Continued from page* 125]

cytes average 5,000,000 per cubic millimeter of blood in a healthy man, 4,500,000 in a woman, while compared with these huge figures the leucocytes are insignificant in quantity—8,000 per cc—little more than one-tenth of one percent of the erythrocytes. However, this is no indication of their importance since they constitute the police force of the body and their numbers rise rapidly during an infection, when they are engulfing and destroying bacteria. They have the power of leaving the blood vessels and wandering out into the tissues of the body, wherever needed.

Human erythrocytes average 7.5 micra in diameter in flat view (one micron is 0.001mm) and since they will appear in almost any section of an organ, may be used in computing sizes of other cells seen in the same field. Sizes differ in various species and animals and this is of some importance in distinguishing different bloods in criminology. Erythrocytes contain the pigment haemoglobin which has a high affinity for oxygen, and collectively they constitute the transportation system for this important gas.

Two experiments will be interesting in this connection. Allow a fresh and unsealed blood slide to dry slowly by evaporation from under the cover glass and watch the formation of crenated erythrocytes. The shrinkage from loss of water produces a prickled appearance. To another fresh slide, add distilled water at one edge of the cover with a pipette and apply a piece of blotting or filter paper at the opposite edge, thus drawing the water through and irrigating the preparation. Excess water dissolves out the haemoglobin and leaves the erythrocytes as faint circles called blood shadows. Try irrigating with 1% tannic acid and see what happens. Also try a strong salt solution in distilled water.

For a permanent slide, apply a drop of blood to a cover glass and immediately cap this with a second cover glass, then draw the two apart by slipping one off the other in a horizontal sliding motion. The whole operation must be performed rapidly and without pressing the two covers together. Holding the two covers by their edges, wave them in the air to dry for a few minutes, then place face up in a shallow container to serve as a staining tray. Cover one of these blood films with a counted number of drops of Wright's blood stain, best purchased as a solution ready for use since its manufacture is a bit complicated. Use a pipette and have a watch at hand for accurate timing. The stain is allowed to act for one minute, then to it is added the same number of drops of distilled water as were counted for the stain. After two more minutes wash the cover in distilled water, either by waving gently in a tumbler of this water or by using a washing bottle.

Length of time of this washing is important and results must be checked under the microscope as it proceeds. The general tone of the slide as well as of individual corpuscles is at first blue, then it fades through pink, salmon and yellow and finally out altogether. Check it at the salmon stage by blotting gently with either blotting or filter paper and stand the cover on edge to complete drying. When absolutely dry, invert over a drop of balsam on a slide. Use more water or a longer time in bleaching if the slide is too blue; use a longer time in staining or a shorter stay in water if too red or light. Almost any textbook in histology or anatomy, obtainable at libraries, will include a colored plate of human blood under Wright's stain, identifying and naming all of the forms of corpuscles and what they should look like with this differential stain. Compare your preparations with such a plate until a satisfactory slide is obtained. The corpuscles should be in a thin film and neither clumped, crenated, distorted or crushed, over at least one-third of the cover glass area.

An alternative mountant is euparal, more expensive than balsam but yielding a more brilliant and permanent slide. Then there is another method of preparing the blood film, preferred by many. Place a large drop of blood on a slide near one end, the slide flat on the table before you. Hold a second slide in the right hand, inclined at an angle of 40° to the horizontal slide and in contact with the end away from the blood, the acute angle facing the blood. Pull this slide rapidly along the flat one toward the blood until it makes contact with the drop, then immediately push it away toward the opposite end of the slide on the table. The drop spreads out along the line of contact and follows the inclined slide by capillary attraction, making a thin and even film over the whole surface of the flat slide. After drying, this film is stained as before and a large rectangular cover glass is applied.

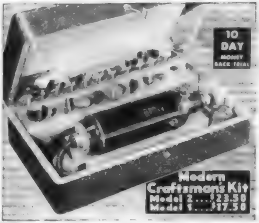
Make stained smears of the blood of other animals as opportunity offers and comparisons will be found interesting. The erythrocytes of mammals lose their nucleus during development but those of other vertebrates are nucleated throughout life and are hence biconvex in shape instead of biconcave. Also they are oval instead of round, and larger in size, thus readily told from mammalian blood smears. One interesting exception among mammals occurs in the camel family, the erythrocytes of camels and llammas being non-nucleated but oval.

In criminological cases suspected blood stains are soaked in normal salt solution (0.75% sodium chloride in distilled water) and examined under the microscope. Presence of corpuscles definitely establishes the stain as blood, and circular, small, non-nucleated corpuscles would mean mammalian blood. Measurements would narrow the field, but blood typing would be resorted to if there was still doubt as to human origin of the stain.

Sometimes the corpuscles have been destroyed

[*Continued on page* 141]

for a *Merry Christmas* and a HOBBY NEW YEAR



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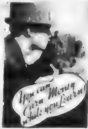
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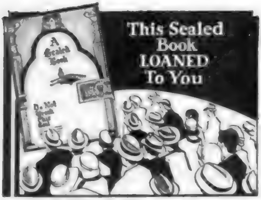
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# The Hi-Fi Receiver

[*Continued from page* 124]

before starting to assemble. The location of the various components is shown in the photographs and should be carefully followed for best results. The power transformer is on the same side as the antenna input but it is better there than elsewhere. The r. f. system won't pick up hum while the audio system will. This wide separation between power transformer and output transformer helps to keep the hum level to an extraordinarily low value so that it can't be heard a foot from the speaker.

The filament circuit should be wired first, following the mounting of all components. Note that the 6.3-volt winding feeding the 6A5G's must not be grounded, since this would short out the cathode resistor as the heater is connected to the cathode within the tube. Then wire in the r. f. transformers and variable condenser. It is not necessary to shield the r.f. grid leads. The variable condenser rotor contacts are grounded through the condenser frame, but this is not enough. Bring a separate lead from each rotor of C1 to the chassis and *solder* to the chassis. All r. f. ground connections *must* be soldered. This can not be too strongly emphasized as oscillation or instability is almost invariably the result of poor grounding of such circuits.

The audio system may now be wired and the receiver will be ready for alignment. This should be done with a test oscillator and output meter but if they are not available, the job can be done on broadcast signals. First tune in a weak station at about 1,500 k.c. Then adjust each trimmer condenser so the signal is loudest with the dial set at 10 or 12. The middle section of C1 will be found sharper than either of the other two and accordingly the condensers are brought into line with it. Examine the tuning condenser to make certain the plates are uniformly spaced when all are in mesh. If the frame is strained in mounting the rotors may be out of position.

If a vacuum-tube voltmeter is at hand, the phase inverter can be checked by applying an audio signal to the input grid of the 6C8G and measuring the voltage across the grid of each 6A5G. The voltages should be equal. If not, increase or decrease the value of R18 until equality is established.

The output transformer is a laboratory standard type. The one shown in the photograph has several line output windings which are not required so the one specified in the parts list has only voice coil windings. Otherwise the transformers are identical. Connect the speaker, after assembling it in its cabinet, to the 7.5-ohm output winding of the transformer. The speaker is a permanent magnet dynamic type so no field supply is required.

The front panel is a standard relay rack size and is of aluminum, for ease in drilling. It is mounted in a standard steel cabinet, as illustrated.

Two of the resistor values shown in the diagram differ somewhat from those usually recommended. The 6R7 cathode resistor, for instance, was decreased to 1,500 ohms instead of the more usual 2,500 ohms with an improvement in audio gain. Also, the cathode bias resistor for the 6C8G was changed to 4,000 ohms instead of the usual 1,500 ohms to eliminate "motor-boating" and provide a higher voltage output to drive the 6A5G's. The 500-ohm resistor, R23, in the power transformer secondary return circuit is employed to reduce the output voltage to 300 volts for the 6A5G's. The life of these tubes is much longer if operated within their normal rated voltage rather than at the maximum of 325 volts.

The 12-inch high-fidelity speaker and its enclosure cost a little over thirty dollars, nearly half the cost of the entire outfit. There is no use in building an excellent receiver and connecting it to a poor speaker. Likewise, don't use a low quality output transformer. The one employed in the receiver is a laboratory standard type, larger than the power transformer. It is rated flat within 1 db from 30 to 20,000 cycles. Some cheap output transformers waste two-thirds the power in addition to having poor frequency response.

* * *

Molybdenum, besides being hard to say, is hard to wear out; in fact, it is impervious to attack by hydrogen, and can be used in the intensely hot heater windings of hydrogen furnaces. For some uses, molybdenum wire must be almost unimaginably fine. A leading electrical products manufacturer has just announced production of molybdenum wires as small as one-thousandth of an inch in diameter and sheets twenty-five thousandths of an inch thick. A human hair is about three thousandths of an inch thick.

* * *

A little-known mineral called spodumene is gaining usefulness in such varied lines as air-conditioning systems, in storage batteries, pottery making and production of lithia water.

# Toy Invention!

[*Continued from page* 125]

howl, were added to the line. The Pluto Pop-up Kritter followed and last year he sold to the tune of 600,000.

Anything that suggests action suggests an idea to Edward Savage. In designing the Gabby Goose his purpose was to produce a pull-toy having a lively and comical head and neck action. Gabby's "innards" were so constructed that his long neck moves from a position lying along his back to an extreme forward position, while the head and long upper bill remain constantly horizontal as it moves back and forth, the lower bill opening and closing. A loud "quack" adds to the play value of the toy. The voice is simply a spring reed in contact with a diaphram which is caused to vibrate. The voice principle is old but its method of application is patented. More than 250,000 Gabbies have been sold.

Other toys, probably not so well known, made a success of themselves in their own right. The Rainbow top, for instance earned more than $4,000 for its inventor and sold to the tune of 150,000. As the top spun, different colored discs gave off changing hues.

Two of Savage's most recent toy inventions that are destined to insure him immortality as the Toy King are the Donald Duck Pop-Up and the Snoopy Sniffer. Donald Duck is the latest of the pop-up kritters, but with an added innovation. The strings that "pop-him-up" are also pulled to revolve the wings while the voice quacks excitedly in typical Donald Duck fashion. The entire action occurs with a great deal of commotion and the toy has already proved so successful that 100,000 have been sold at 35 cents each. Final Christmas sales may run this figure up to a million!

Snoopy Sniffer is another character whose sudden rise to fame may make a fortune for his creator. Its mechanism is so designed that as the dog creeps along, its rear rises and its nose scrapes the ground, and vice versa. The idea has captured the imagination of a toy-minded public, whose Christmas purchases of Snoopy have already netted its inventor $8,000 in royalties.

Savage himself doesn't know how he thinks up these brilliant five and ten thousand dollar ideas. He seldom wakes up with one, he says, and his own suspicions are that he just works them out on paper in his drafting room. If he sits down at his drawing board with an idea, he usually emerges with something entirely different. He feels that if he completes one out of three ideas, he is doing well.

Mr. Savage spends between two and three hundred dollars for patents to protect his inventions and warns would-be inventors that if they have a good idea, it should be carefully protected or the idea will be copied. His extensive experimenting costs money, and considering his time,

[*Continued on page* 135]

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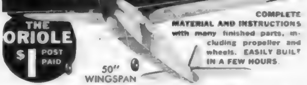

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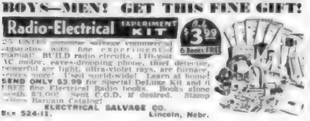

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## Cracking Down On Quacks

[*Continued from page 127*]

suspicion of illegal entry, but was released. In an attempt to vindicate himself, Anacker visited the Indian Bureau and the Department of Labor in Washington, D. C., and then camped for several weeks at a tourist camp near Berwyn, Md., selling Indian wares and his own medicines. There he was again arrested and returned to California for trial.

One of the cleverest quack doctors who ever flim-flammed the American public was a man who called himself Espanto. Following a Post Office investigation a couple of months ago he ceased business but not before he had "milked" untold thousands for at least two years.

Espanto's headquarters during the height of his mail-order popularity was a wee cabin in a small Florida winter resort. He was said also to maintain a summer place in Iowa. In appearance the "doctor," who claimed to be a bona fide Indian medicine man and expert extraordinary on divers herbs, leaves and old-fashioned redskin remedies, resembled nothing so much as one of those medicine show charlatans of grandpa's day and age. He was about 65 years old, wore his hair long, always was garbed in the traditional frock coat, wing collar and flowing tie, and assumed a patriarchal expression, voice and manner.

Actually, for a small sum of money, Espanto volunteered to tell you by mail exactly what was the matter with you, and would offer a medicine to cure the ailment if you would send him a small sample of a piece of clothing worn by yourself.

Espanto conducted an enormous business with the aid of an imposing-looking circular at the top of which was a picture of himself surrounded by the statement, in huge letters: "Uses non-poisonous remedies only."

Postal inspectors had a number of interesting experiences when, writing under assumed names, they sent in for Espanto's extravagantly ballyhooed "treatment." In one instance they enclosed a piece of common cheesecloth, along with the assertion that this was a piece of underclothing worn next to the skin by a chronic sufferer from a certain disease. The learned "medicine man" immediately wrote the "sufferer" saying he was a victim of a certain serious ailment and offered, upon receipt of a certain sum of money, to send a sure-fire cure!

Like the Indian medicine man, Dr. A. Rockford Lewis, Southern voodoo doctor, operating from his home in New Orleans, succeeded in doing an enormous quackery business, local and through the mails, until postal inspectors forced him out. Lewis, now Uncle Sam's guest in Atlanta penitentiary, specialized in "charms," promising prospective clients a cure for all ills, success in love, any kind of job they wanted, in fact, anything they wanted.

Lewis was arrested last Spring in New Orleans for using the mails to defraud and was found

[*Continued on page 142*]

## Toy Invention!

[*Continued from page* 133]

materials, patents and miscellaneous expenses, money received from a successful invention isn't all gravy.

That his inventive genius travels in wider circles than that of toys is testified to by the fact that he has 45 patents, covering, in addition to toys, a safety razor, a fire extinguisher, a typewriter spacer, a check protector, a gasoline gauge and a candy forming machine, all of which were bought by manufacturers in their respective fields. As an automatic machine designer (in his earlier years before he went in for toys in a big way) he invented the key used to open the top of a can of Shinola shoe polish and then he designed the machinery to make and attach the key to the box. This simple invention revolutionized the polish business and resulted in the additional sale of millions of cans.

Mr. Savage confides that no special circumstances contributed to his successful career as a toy inventor. He thinks he could invent toys just working in the kitchen or garage as well as in the attic and basement. His whole secret, he says, lies in the fact that he tries to think up practical ideas, then works them out carefully on a drawing board and finally experiments with them in his workshop. If the mechanism functions satisfactorily, he designs and contructs a crude figure of a toy in which to try it out and proceeds to iron out the kinks, if any develop. When the toy functions to his total satisfaction, he has a search made, and if it proves a new idea, he takes out patents on it and then submits it to a manufacturer for consideration. Sometimes the manufacturer will suggest changes and refinements, but that's okay with Edward Savage, because he knows by then that his toy will go into production; that it may become another hit and net him five, ten, or fifteen thousand dollars! Now who would complain about that? Would you?

Paint manufacturers say: After tightly closing a can of paint which you do not expect to use again soon, shake the can thoroughly several times during the first 24 hours, so that the paint will absorb the oxygen and no thick skin will form on the paint surface.

For 101 years the Hawaiian volcano Mauna Loa has averaged one crater outbreak every three and a third years, and one flank lava flow every six years.

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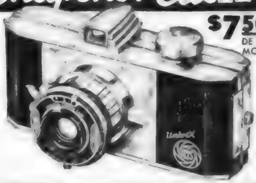

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## Lists Requirements Of Ideal Research Technician

Naval architects and marine engineers, themselves scientists, heard a description of the ideal research physical scientist recently from the lips of Dr. Ross Gunn, technical adviser to the U. S. Naval Research Laboratory.

The research physicist most closely approaching the ideal, Dr. Gunn said, is distinguished by intelligence and firm grounding in the fundamentals of physics, chemistry, mathematics and engineering.

"He should be especially keen in estimating situations and reaching sound decision," he continued. "His judgment and perspective should be such that he can give his talents systematic direction.

"He should be an original thinker and have original ideas. He should be exceptional in his ability to plan, think and do things without being told.

"He should have the courage of his convictions, yet must not be blinded by them. He should constantly seek the truth. He should be especially successful in working harmoniously with others toward a common end."

Dr. Gunn hasn't yet met this ideal scientist, and doesn't expect to meet one. "Probably no single man can meet the specifications completely," he declared.

## Study Blood With Microscope

[*Continued from page* 131]

by crushing, chemicals or age, so that their absence does not necessarily mean the stain is not blood. The one sure test is to try for the presence of *hemin crystals,* widely used in all doubtful cases. Place a drop of blood on a slide, or use a bit of cloth saturated in blood—the stain may be new or old—and add a few crystals of common salt. If a fresh drop or blood stain is used, heat over a low flame until dry; if already dry this step may be omitted. Put on a cover glass and irrigate with glacial acetic acid to float the cover, then heat until the acid steams or boils away, remove the cover, put on a drop of balsam and then a fresh cover, making the mount permanent. Examine under high power for small dark-brown plates of a narrow rhombic form, lying singly, as crosses or as stars. Their occurrence is a positive indication of the presence of blood.

If, following last month's installment, your microscope is equipped for studies under polarized light, try this illumination with hemin crystals, both with and without the analyzer in place.

In a recent experiment with interior decoration in a factory, workers voted preference for an orange painted milling machine, rather than red or gray.

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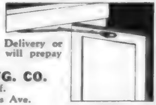

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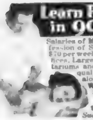

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## Cracking Down On Quacks

[*Continued from page 134*]

guilty on that charge, in United States district court.

Testifying on his own behalf, Lewis, while admitting use of the mails, insisted that his various charms, medicines and concoctions brought about the cures and the good fortune he claimed for them. From almost every pocket the accused pulled out articles of almost every shape and shade and laid them on the table before him. Beans, medals, herbs, powders, charms in various designs were included. He explained the magic of each. For the lovelorn he had a specially prepared perfume. Anyone who sprinkled this on himself, the "doctor" insisted would be besieged by persons laying their affections at his or her feet.

Post Office Inspector Dunbar was one of the chief witnesses for the Government against the voodoo doctor. Writing under one assumed name the inspector told the doctor that he would like to have a preparation that would enable him to get the job as railroad president with a salary of at least $15,000 a year. He sent the money requested for the magic medicine and received various luck charms, perfumes and enchanted powders, Dunbar told the jury.

F. W. Casey, Government chemist, offered an analysis of many of the preparations which were purchased in the effort to make a strong case against Lewis. Dr. F. W. Norris, Food and Drug Administration medical technician, said that none of the preparations could perform the miracles claimed for them.

Dispensers of medicine and mechanical gadgets spring up every year and sometimes succeed in enjoying a fair amount of business before government men catch up with them. After that, they usually find themselves behind the eight-ball in a good, strong Federal prison designed to purge them of their curative tendencies. The government's "cracking down" program is fast making it too hot for the "quacks" to operate, and is saving people of this country a lot of dough.

## Scientists Identify Wood In Pulverized, Sawdust State

Wood analysis, which has played a notable role in crime detection, notably in the Lindbergh kidnaping case, is carried to a new refinement by Drs. J. Kisser and L. W. Sekyra, research botanists of the Vienna Academy of Science.

They have developed methods of microscopic examination by which they have been able, in many instances, to identify wood that had been pulverized or reduced to sawdust, and in some cases even after it had been burned to ashes.

Canada produces 22 metals important in world markets.

# Radio Forecasts The Weather

[*Continued from page* 126]

mitted note may be interpreted to evaluate the air temperatures at all heights.

After being calibrated and otherwise tested, the radiotelemeter is encased in its compact chamber and attached to the tail of a small balloon which at the start of the ascent is inflated to about four or five feet in diameter. The aerologists, their adiabatic chart set, stand by the ground equipment, which consists of an antenna, receiver, amplifying apparatus and recorder.

The balloon takes flight. as described in the earlier part of this article, issues its signals, finally bursts in the rarified air of the stratosphere, and the instruments descend safely to earth by parachute.

A radiometeorograph station costs about $12,000 the first year of operation. The radio set is responsible for $1,500 of this. The radiotelemeters run around $24 apiece, although not so many are lost as you would think. The balloons cost about $2.25 each, hydrogen about 75 cents for one ascent and the parachute is $1.

With the new radio forecaster pretty well developed, although far from perfect, weathermen now look forward to means for getting to the stratosphere more quickly. It's important to know what's going on 10 or 15 miles in space and if forecasts are to be accurate, the man in the street must get his report in a hurry. Maybe, some day, rockets will be carrying these instruments aloft at lightning speeds and the radio will give man an instantaneous weather forecast.

# Nations Plan Oceanic Aero Weather Reporting Service

An ocean-wide cooperative weather-reporting service spanning the North Atlantic will soon be set up to provide data for commercial airline operation between North America and Europe. More than $1,000,000 will be spent by governments and airlines to provide meteorological information following the Transatlantic Air Conference at Dublin which worked out details of the plan.

In addition, a coordinated radio service, providing for the use of a single range of frequencies and adopting forms and procedures worked out by Pan-American Airways through years of overwater flying, has also been set up to care for the coming needs of commercial flights. The weather service, into which will be integrated the services of the Canadian, British, Irish and Newfoundland governments and of Pan-American Airways, will represent the greatest ocean-wide flying weather reporting system in use.

Artificial rubber can be made from tomatoes, according to an Italian report.

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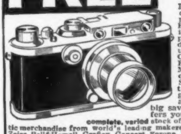

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## Science Decrys Radio Drama Depicting Invasion Of Earth

The radio-drama scare that recently gave a whole countryside a jittery night raises the question: What does science have to say about the actual possibility of such happenings, imagined by their original author as based on a possibility scientifically at least conceivable?

To begin with, astronomical research since H. G. Wells first wrote "The War of the Worlds," in 1898, has changed the idea of highly organized, human-like life on Mars from a distinct possibility to a decided improbability. Air is scarce on our neighbor planet, water is scarcer, and the daily temperature extremes are terrific.

The chance of life of any kind surviving the journey from Mars to earth on or in a meteorite-like body are very slim. The nearest approaches between the two planets still leave them from 15 to 30 million miles apart. Even at meteor speeds, the journey would take months, through the almost absolute zero cold of interstellar space. Then, on dashing into the earth's atmosphere, would come the frictional heating to flaming temperatures.

Some scientists, unable to account for the origin of life on earth, have passed the buck to other unknown planetary sources, suggesting that organisms of very low evolutionary status, like bacteria or fungus spores, may have made the journey thus. There have even been bacteriological examinations of meteorites, with that theory in view. But the majority of biologists are still unconvinced of the validity of such positive results as were obtained.

One element in the radio-engendered panic, a flood of poison gas, is ruled out in the case of meteorites and comets. Meteorites that have struck the earth in historic times have brought no gases of any kind with them. Dead cyanogen gas was reported as spectrographically detected in the tail of Halley's comet. Yet the earth sailed right through that tail in 1910—and nobody even had the "pip."

A conceivable real danger might come from the impact of a giant meteorite, like the one that crashed into the Siberian wilderness in 1908. Effects of such a sky-projectile striking an inhabited neighborhood would be devastating. The Siberian fall was registered on earthquake instruments all over the earth, and the terrific, forest-felling blast of heated air and steam caused by the impact caused an atmospheric ripple as far away as London.

It is always possible that the next big meteorite might fall on or near a great city. But it has been comfortingly calculated that a thousand such falls will be in empty or sparsely inhabited areas for one that hits a center of population.

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**A cable connector** suitable for a wide range of cable sizes. A flattened U-bolt makes it possible to use this connector on highly compressible flexible, or extra-flexible cable without damage.

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**A portable rotary plane** for use where smooth surfaces are required on any kind of steel, iron or other metal. The grinding wheel is adjustable to a fraction of one thousandths of an inch cutting depth.

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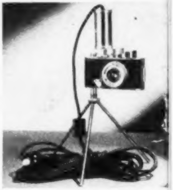

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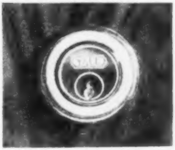

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